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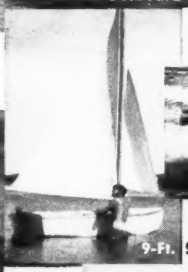

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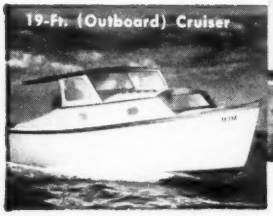

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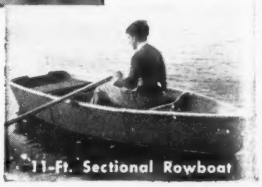

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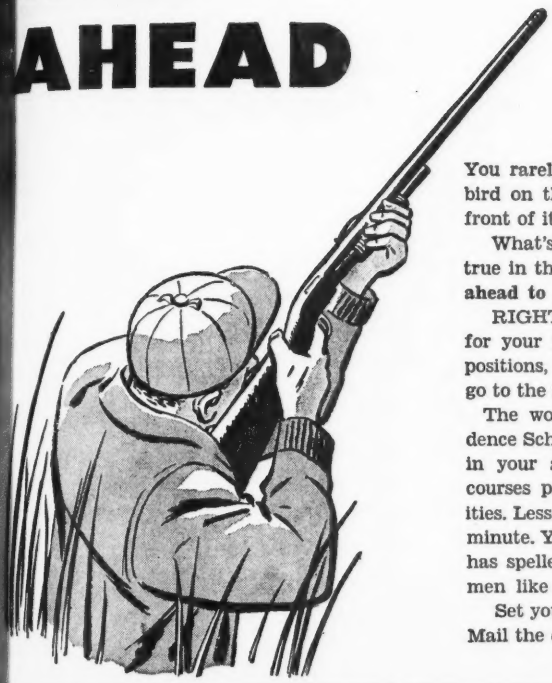

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Sea-going Twists 128
Tips for the boat fan

Wheel Box 130
A housing for the tiller and compass

Built-in Bookcases 132
By James Powell

Aluminum Garage 135

Home & Shop Kinks 136

Car Care 138

Behind the Wheel 139
With Fred Russell

Toy Ferris Wheel 140
This one will make your youngster the envy of the neighborhood kids

How to Refinish Furniture 142
By Roland Cueva

Radiator Cover and Matching Waste Basket 144

DeLuxe Dinner Bell 146
First and last call for chow

Indoor Mail Box 147

Photo Contest 148

Movie Titles in a Hurry 149

Electronic Water Softener 150
For assurance of spot-free negatives

Photo Drawing 151
An easy way of making "pencil sketches"

Photo Kinks 152
Three pages of tips and shortcuts

Snack Set 157

Nut Bowl 159

(Special Features, see page 18)

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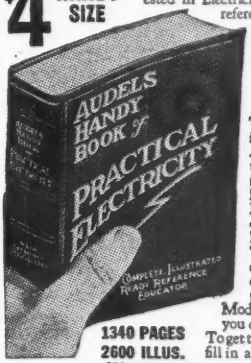

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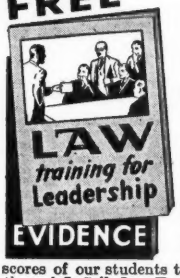

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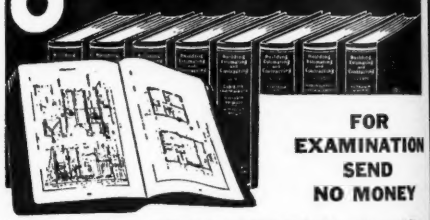

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Why be satisfied with a "one-operation" job? At Coyne you learn Motors, Armature Winding, House and Factory Wiring, Appliances, Power Plant Work, Illumination, Electrical Maintenance—plus the fast-growing branch of Industrial Electronics. Whether you're experienced or not, we train you for a good job, then help you get it! Coyne graduates may use our Lifetime Employment Service as often as they wish.

INDUSTRIAL ELECTRONICS and REFRIGERATION Included

Added training in Electric Refrigeration—principles, testing, repairing—is included with this course. Industrial Electronics given as part of our "all-around" Electrical Training.

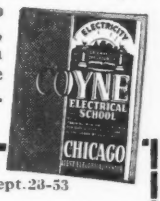
VETERANS! Coyne is authorized to accept veterans for G. I. Training. Coupon brings special G. I. Bulletin.

NON-VETERANS who are short of cash can finance most of their tuition and pay it in easy monthly payments after graduation.

ANY MAN WITH A PHYSICAL DISABILITY whether a Veteran or not may qualify for Coyne training at no cost to himself for tuition or subsistence. Mail coupon for details.

MAIL COUPON for Big FREE Book

Find out NOW what Coyne offers in training for your future. Coupon brings big book filled with fascinating pictures of our great shops and our plans to help YOU. Get your copy FREE. No cost or obligation, and no salesman will call. Rush the coupon. TODAY.



B. W. Cooke, President
Coyne Electrical and Radio School, Dept. 28-53
500 S. Paulina St., Chicago 12, Ill.

Send me your Free Book and tell me about your plans to help me—including Student Finance and added Training in Industrial Electronics and Electric Refrigeration.

NAME.....

ADDRESS.....

CITY.....STATE.....

COYNE
ELECTRICAL AND RADIO SCHOOL
500 S. Paulina St., Dept. 28-53
Chicago 12, Illinois

ESTABLISHED 1899

J. E. SMITH, President
National Radio Institute
The man who has directed the Home Study Training of more men for the Radio Industry than any other man in America.

BE YOUR

I will show you how to start a Radio Service Business without capital

Full Time or Spare Time

VETERANS:

You can get this training right in your own home under G.I. Bill. Mail coupon for full details.

I Trained These Men

Made $612, In 12 Months, Spare Time

"Soon after I finished my experimental kits lessons I tackled my first Radio service job. The neighbors were very cooperative. I soon had all the repair jobs I could handle in spare time. I have made $612 in the past 12 months in spare time."—J. W. CLARK, Wilmington, N. C.

Knew Nothing About Radio

"I knew nothing about Radio when I enrolled. At present I am doing spare time work. I have more than paid for my Course and I have about $200 worth of equipment which has paid for itself."—RAYMOND HOLTCAMP, Vandalia, Ill.

MY COURSE INCLUDES
TELEVISION
ELECTRONICS
FREQUENCY MODULATION

SAMPLE LESSON FREE

SEE OPPOSITE PAGE

Do you want a good-pay job in Radio—or your own money-making Radio Shop? Mail Coupon for a FREE Sample Lesson and my FREE 64-page book, "How to be a Success in RADIO—Television, Electronics." See how N.R.I. gives you practical Radio experience at home—building, testing, repairing Radios with BIG KITS OF PARTS I send!

Many Beginners Soon Make Good Extra Money in Spare Time While Learning

The day you enroll I start sending EXTRA MONEY manuals. You LEARN Radio principles from my easy-to-grasp, illustrated lessons—PRACTICE what you learn with parts I send—USE your knowledge to make EXTRA money fixing neighbors' Radios in spare time while still learning! From here it's a short step to your own *full-time* Radio Shop or a good Radio job!

Future for Trained Men is Bright in Radio, Television, Electronics

It's probably easier to get started in Radio now than ever before because the Radio Repair business is booming. Trained Radio Technicians also find profitable opportunities in Police, Aviation, Marine Radio, Broadcasting, Radio Manufacturing, Public Address work. Think of even *greater* opportunities as public demand for Television, FM, and electronic devices continues to grow!

Find Out What N. R. I. Can Do For You

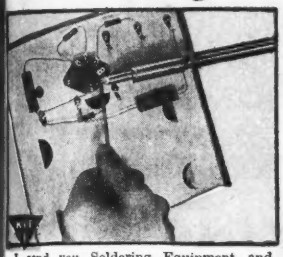
Mail Coupon for Sample Lesson and my 64-page book. Read the details about my Course. Read letters from men I trained, telling what they are doing, earning. See how quickly, easily you can get started. No obligation! Just MAIL COUPON NOW in an envelope or paste it on a penny postal. J. E. SMITH, President, Dept. 8BH, National Radio Institute, *Pioneer Home Study Radio School*, Washington 9, D. C.

Our 34th Year of Training Men for Success in Radio

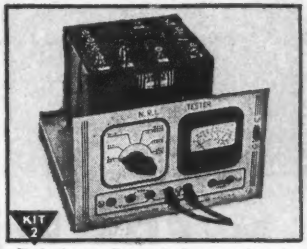
A TESTED WAY

OWN BOSS

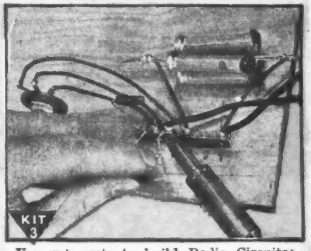
LEARN RADIO BY PRACTICING IN SPARE TIME
with Big Kits of Radio Parts I Send You!



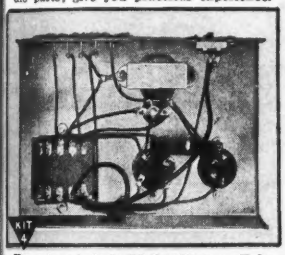
I send you Soldering Equipment and Radio Parts; show you how to do Radio soldering; how to mount and connect Radio parts; give you practical experience.



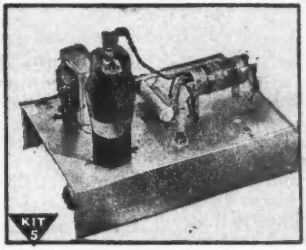
Early in my Course I show you how to build this N.R.I. Tester with parts I send. It soon helps you fix neighborhood Radios and earn EXTRA money in spare time.



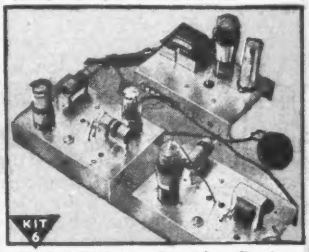
You get parts to build Radio Circuits; then test them; see how they work; learn how to design special circuits; how to locate and repair circuit defects.



You get parts to build this Vacuum Tube Power Pack; make changes which give you experience with packs of many kinds; learn to correct power pack troubles.



Building this A. M. Signal Generator gives you more valuable experience. It provides amplitude-modulated signals for many tests and experiments.



You build this Superheterodyne Receiver which brings in local and distant stations—and gives you more experience to help you win success in Radio.

SAMPLE LESSON FREE

I will send you a FREE Lesson, "Getting Acquainted with Receiver Servicing," to show you how practical it is to train for Radio at home in spare time. It's a valuable lesson. Study it—keep it—use it—without obligation! Tells how Superheterodyne Circuits work, gives hints on Receiver Servicing, Locating Defects, Repair of Loudspeaker, I.F. Transformer, Gang Tuning, Condenser, etc. Thirty-one illustrations.

TO GOOD PAY

MAIL COUPON FOR FREE LESSON AND 64-PAGE BOOK

Good for Both FREE

MR. J. E. SMITH, President, Dept. 8BH
National Radio Institute, Washington 9, D. C.

Mail me FREE, without obligation, Sample Lesson and 64-page book about how to win success in Radio—Television, Electronics. (No salesman will call. Please write plainly.)

Age.....

Name .....

Address .....

City..... Zone..... State.....

Approved for Training under GI Bill

SO IT NEEDS FIXING

By S. T. CHRISTENSEN
the "Fix-it Man"

"WELL, I guess I'm the fellow to see, for I've repaired thousands of refrigerators (home and commercial both), vacuum cleaners, radios, washing machines, irons, fans, lamps, mangles, motors, etc. In fact, many of my customers call me their "electrical appliance doctor." And, "doctoring," I might add, has paid me a good substantial income for quite a few years. Funny, in a way, how I got started. Always liked to tinker and by experimenting around I found that most electrical appliances had many things in common. That, regardless of what the appliance was used for, or who the manufacturer was, the basic principles were much the same. From fixing my own appliances to fixing friends' and then for strangers at a fee, seems now to have been but a small step.

What to Charge?

At first, I let the owner decide the charge and frankly, I was amazed at what I earned per hour. But then, when one figures what initial costs are involved in buying most electrical appliances, one can readily see that spending extra dollars for repairs is well worth while. Before long I was making more in my spare time repairing than from my regular job. The result . . . I went into business for myself. When war came, business boomed, for new appliances were not available.

For a while, repair parts (needed on some jobs) were a little difficult to get. But that situation quickly adjusted itself and many repair parts were given the high priority rating of AA2. After all, we had to provide for the health and well-being of our civilian population.

The Future Offers

Friends ask me about my future. And, I think I've got a grand one. Age is no handicap in repairing. I have in my files enthusiastic letters from repairmen ranging in age from 18 to 79 years. Now the war is over we are certain to see hundreds of new products on the market . . . products that the average person never dreamt of. These new products and our old appliances are all going to need at some time or other "fixing." Well, I'll still be the fellow to do it. The field open for appliance repairmen is unlimited. I don't worry at all about too much competition.

If You Are Ambitious

To the contrary, I've prepared a complete course, chuck full of simple, easy to understand photos and drawings and written in the same non-technical language as this article. I know the course is good, because I have hundreds of men all over the country writing to me telling me how the course has helped swell their pockets with cash. If you too want to prepare now for your future, I suggest you read the next page and send me the handy coupon."

Advertisement

BIG MONEY INDEPENDENCE

A PROFITABLE LIFETIME BUSINESS OF YOUR OWN!

LEARN ELECTRICAL APPLIANCE REPAIRING

PREPARE NOW FOR THE FUTURE

If now employed, start your home appliance repair business NOW in your spare time and be set with a business of your own no matter what happens. You don't need elaborate fixtures or expensive equipment to be a successful repairman. Operate from your garage, basement, vacant store, etc. Work as many hours as you wish—the home appliance repairman is his own boss. It is a profitable occupation for on many types of repairs it is not unusual for a repairman to charge on the basis of $5.00 to $6.00 per hour. Don't gamble with your future—learn a trade that will always support you. Remember, as long as electrical appliances are used, there will be a need for electrical appliance repairmen.

If you are at all mechanically inclined—can hold and use tools—then you have all of the qualifications required for becoming a big money earning home appliance repairman. It does not matter if you have not had a great deal of schooling or had previous experience along these lines—WE WILL TEACH YOU. Age should be no barrier—nor should any minor physical handicap.

New Course Tells All

Profusely illustrated, our new course shows you in simple, easy to understand language and drawings how to make each repair on refrigerators, vacuum cleaners, washing machines, motors, etc. Explains and gives you a working knowledge of electricity, welding, nickel plating, etc. Shows you how to build the power tools you need and how to solicit and keep business coming to you. Not a theory course but an honest to goodness course written by and used by repairmen the country over. Price of course is so low that the savings on your own household appliance repairs will quickly pay for it. Act now! Mail the handy coupon below today.

Read What Our Students Say About Course

I really believe your course the best investment a mechanically minded man can make.—Claude E. Allen, Indianapolis, Ind.

I have received your Course in Appliance Repairing and I must say I am well pleased with same. I am only sorry I did not have said Course some years ago. I have learned so much more through this course I would not part with it.—Charles Schwarz, Hamilton, Ohio.

The Course in Appliance Servicing arrived a few days ago. Want to take out a few minutes of my valuable time to let you know that this is just what I have been looking for ever since I opened up my Fix-It shop. I must admit that you told the truth when you said that it contains quite a bit more information than I bargained for.—P. J. Bretl, Sebring, Ohio.

I am a mechanic for the Western Union Telegraph Co. Three days after receiving the lessons in refrigeration I earned the exact cost of the course.—Henry S. Lee, Washington, D. C.

I work day times at the shipyard and after 4:00 P.M. I operate from my cellar and garage. I average $10.00 to $15.00 clear every day.—Walter Hanby, Brockton, Mass.

GET STARTED TODAY — MAIL THIS COUPON

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2835 N. Central Ave., Dept. D-5106
Chicago 34, Illinois

Please send me free illustrated literature about America's Fastest Growing Industry—ELECTRICAL APPLIANCE REPAIRING.

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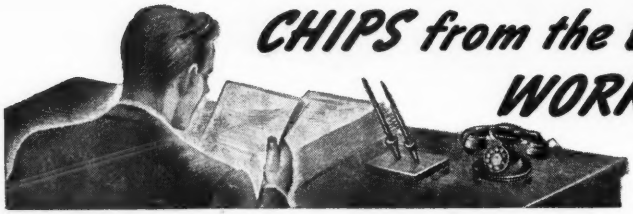
Address .....

City..... State.....



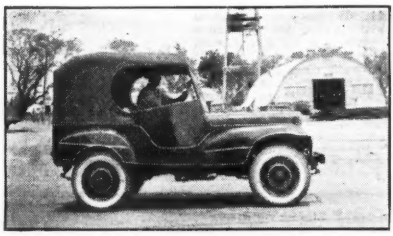
CHIPS from the EDITOR'S WORK BENCH

Electrons and Electricity

Some curious confusion over the relationship between "electronics" and "electricity" has developed during the last few years, mainly as a result of the careless and sometimes misleading use of the words in advertising copy which gives the impression that they mean two different things. *They don't.*

Before the electron theory of matter was developed and accepted, the nature of "electricity" was a considerable puzzle. Something flowed through wires when certain chemical, thermal or magnetic tricks were performed, but just what it was no one really knew. Scientists and practical workers alike referred to the mysterious force as "current," "current flow," "current of electricity," "electrical current," etc., the word "current" being adopted because many of the actions of electrical circuits could be explained conveniently by water analogies. There is now plenty of evidence to support the theory that this "current" is a movement of dislodged electrons, so present-day practice is to call the force "electron flow" or "flow of electrons." Electricity itself hasn't changed; its definition has merely been modernized: *electricity consists simply of a flow of electrons.*

CLASSY JEEP



Lieut. Commander W. P. Tyler, USN, of Medium Seaplane Squadron Three, stationed at Kaneohe, Hawaii, says that there are eighteen privately-owned surplus jeeps in the squadron in various stages of glorification. The one pictured above is an especially racy looking job, "built up with the assistance of the local citizenry, who show remarkable ability in originating ideas and designs concerning former Army and Navy vehicles," the commander writes. A $5.00 Workbench Award is going to him.

The automobile manufacturer who lists "electronic ignition" as one of the features of his new model and the appliance manufacturer who crows about the "electronic heating" of his new iron are both entirely correct technically. However, any implication that "electronic ignition" and "electronic heating" are different from or superior to other kinds of electrical ignition and heating is a lot of hooey. Ad copy writers just love the word "electronic" and use it as a fancy substitute for "electrical." It's a substitute, all right, but it's also a synonym.

"Quick, Henry, the Flit!"

The old gag about crossing mosquitoes with lightning-bugs so you could tell when they were coming has been realized for practical scientific purposes. The feat was not accomplished by an impossible genetic combination but by making ordinary mosquitoes shine in the dark. And the beauty of it is that the mosquitoes don't know anything about it.

A scientist from India, Dr. Rajindar Pal, working at the London School of Hygiene and Tropical Medicine, wanted to follow the flight path of night-flying mosquito species, especially the ones that carry malaria germs and yellow fever virus. He caged his insects in old-fashioned lamp-chimneys and gave them a few puffs of a fluorescent dust, that shines when the invisible rays of ultraviolet light fall on it. After the insects were released, he could follow them easily, no matter how dark it was, simply by turning the beam of an ultraviolet lamp on them!

Workbench Contributions

Get your picture into print, and get paid for it, too. Snapshots of you and your latest workshop project are eligible for publication in this department if they are sharp and clear. For each picture used, we pay five dollars. Describe the project briefly, and be sure to include your full name and address in both the letter and on the print. Please do *not* send negatives, colored prints or color transparencies. Address all such contributions to Editor, MECHANIX ILLUSTRATED, 67 West 44th Street, New York 18, N. Y.

I Put You to Work with Your Hands to LEARN RADIO! You Build Receivers! You Make Typical Defects Occur and Make Tests to Prove the Theory!

F. L. SPRAYBERRY, PRESIDENT of the SPRAYBERRY ACADEMY OF RADIO. This is the man who directs your study. His years of experience and Radio "know-how" assure you of the finest in home Radio Training!

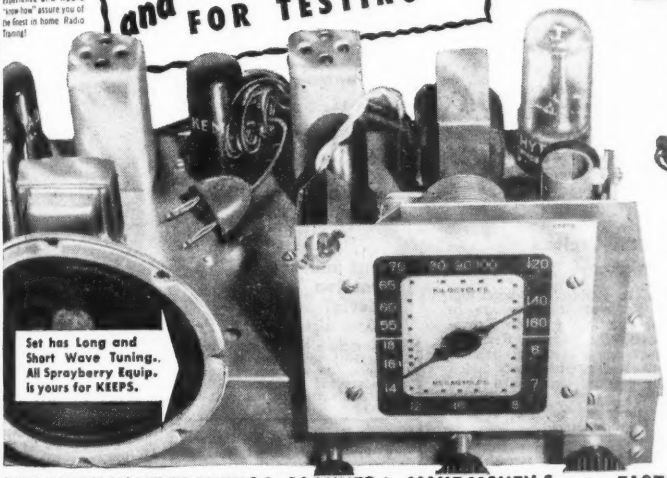
LEARN RADIO to MAKE MONEY!

LOW COST TRAINING — EASY PAYMENT PLAN!

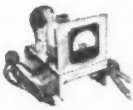
YOU GET 8 BIG KITS OF RADIO PARTS & EQUIPMENT including 2-BAND SUPER RECEIVER! and 16 RANGE METER FOR TESTING

You Learn at Home How to Build and Test Dozens and Dozens of Circuits — Simple and Complex!

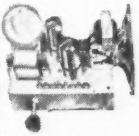
YOU DO OVER 175 INSTRUCTIVE EXPERIMENTS



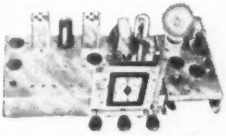
YOU BUILD ALL THESE TESTERS . . . . . AND MORE!



I give you a fine, moving-coil type Meter Instrument on Jewel Bearings — with parts for a complete Analyzer Circuit Continuity Tester. You learn how to check and correct Receiver defects with professional speed and accuracy.



You'll get valuable experience and practice building this Signal Generator and multi-purpose Tester. Makes a breeze out of fixing Radios and you don't have to spend money on ready-made Equipment.



Soldering, wiring, connecting Radio parts . . . building circuits with your own hands — you can't beat this method of learning. When you construct this Rectifier and Filter, Resistor and Condenser Tester, etc., you get a really practical slant on Radio that leads to a money-making future.

SPRAYBERRY HOME TRAINING is PLANNED to MAKE MONEY for you FAST!

I train you with regular professional Radio Equipment. I tell you exactly what to do . . . how to do it. You handle Radio Parts, see them operate, learn what they're for. With the fine Kits I supply, you learn how to build Radio Circuits, construct your own Test Equipment. I'll show you how to cause typical Radio defects so you can watch and see how they act. You learn the latest methods for trouble-shooting and repair. All this adds up to the finest kind of "bench" experience. And you get it right in your own home. In no time at all, you'll be ready for a business of your own or a good job in Radio, FM, Television, Radar, Industrial Electronics, etc. Now's the time to get started!

VETERANS!

Approved for G.I. Training Under Public Laws 16 and 346.

SEND FOR MY VALUABLE FREE BOOKS!

"How To Read Radio Diagrams and Symbols"

A wonderfully complete new book, which explains in simple English how to read and understand any Radio Set Diagram. Includes translation of all Radio symbols. Send for this volume at once! It's free! With it I'll send you another Big Free Book, describing in detail my Radio Electronic Training!

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F. L. Sprayberry, President
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Please rush my FREE copies of "How to MAKE MONEY in RADIO, ELECTRONICS and TELEVISION" and "How to READ RADIO DIAGRAMS and SYMBOLS."

Name _____ Age _____

Address _____

City _____ State _____

☐ Check here if a veteran.

(Mail in envelope or paste on penny postcard)

You receive all parts, including tubes, for building this fine, modern Superheterodyne Receiver. This and other valuable standard equipment becomes your property.

Learn RADIO TELEVISION, ELECTRONICS by SHOP METHOD HOME TRAINING

Let NATIONAL SCHOOLS, of Los Angeles, a practical Technical Resident Trade School for over 40 years, train you for today's unlimited opportunities in Radio

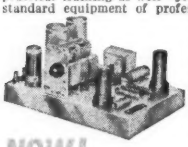
these two **FREE** *books will tell you how*

Good Jobs Await the Trained Radio Technician

You are needed in the great, modern Radio, Television and Electronics industry! Trained Radio technicians are in constant and growing demand at excellent pay—in Broadcasting, Communications, Television, Radar, Research Laboratories, Home Radio Service, etc. National Schools Master Shop Method Home Study Course, with newly added lessons and equipment, can train you in your spare time, *right in your own home,* for these exciting opportunities. Our method has been proved by the remarkable success of National Schools-trained men all over the world.

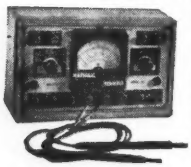
You Learn by Building Equipment With Standard Radio Parts We Send You

Your National Schools Course includes not only basic theory, but *practical* training as well—*you learn by doing.* We send you complete standard equipment of professional quality for building various experimental and test units. You advance step by step until you are able to build the modern superheterodyne receiver shown above, which is yours to keep and enjoy. You perform more than 100 experiments—build many types of circuits, signal generator, low power radio transmitter, audio oscillator, and other units. The Free Books shown above tell you more about it—send for them today!



NOW!

New Professional Multitester Included



This versatile testing instrument is portable and complete with test leads, batteries and tubes. Simple to operate, accurate and dependable. You will be able to quickly locate trouble and adjust the most delicate circuits. You can use the Multitester at home or on service calls. It is designed to measure AC and DC volts, current, resistance and decibles. You will be proud to own and use this valuable professional instrument.

GET THE DETAILS—SEND THE COUPON

Lessons and Instruction Material Are Up-to-Date, Practical, Interesting

National Schools Master Shop Method Home Training gives you basic and advanced instruction in all phases of Radio, Television and Electronics. Each lesson is made easy to understand by numerous illustrations and diagrams. All instruction material has been developed and tested in our own shops and laboratories, under the supervision of our own engineers and instructors. A free sample lesson is yours upon request—use the coupon below.

Here's Just a Few of the Interesting Facts you Learn with the FREE MANUAL

1. Routine for diagnosing Radio Troubles.
2. Preliminary inspection of Receivers.
3. How to Test and Measure Voltages.
4. How to Test Speaker in Audio Stages.
5. How to Trace the Circuit and Prepare Skeleton Diagram.
6. Complete Reference Table for Quickly Locating Receiver Troubles.

VETERANS

If you are a veteran, qualified for training under the G.I. Bill, check the coupon for a Special Bulletin.

G. I. APPROVED

NATIONAL SCHOOLS

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Los Angeles 37, California

(Mail in envelope or paste on penny post card.)

Mail me FREE the books mentioned in your ad including a sample lesson of your course. I understand no salesman will call on me.

NAME_____ AGE_____

ADDRESS _____

CITY_____ ZONE____ STATE_____

☐ Check here if veteran of World War II

INVENTORS

patent laws encourage the development of inventions

The Rules of Practice of the U. S. Patent Office advise—unless an inventor is familiar with such matters—that he employ a competent registered attorney or registered agent, as the value of patents depends largely upon the skillful preparation of the specifications and claims.

The firm of McMorrow, Berman and Davidson is registered to practice before the U. S. Patent Office. Additionally, it maintains a staff of attorneys able to readily understand inventors' disclosures, to advise concerning patentability, and to prepare appropriate specifications and claims for filing with the Patent Office.

If an inventor believes he has an invention, a search of the most pertinent prior U. S. patents should be made and a report obtained relative to its patentability. Where such report indicates that the invention appears patentable, in order to secure protection, diligence should be exercised in making application for a patent.

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Send me further particulars as to patent protection and procedure and "Invention Record" form at once. I understand that this request does not obligate me.

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JOB NEWS

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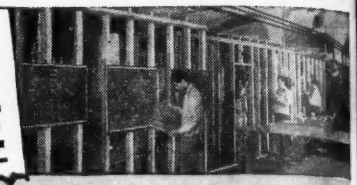

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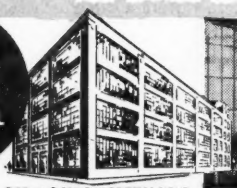

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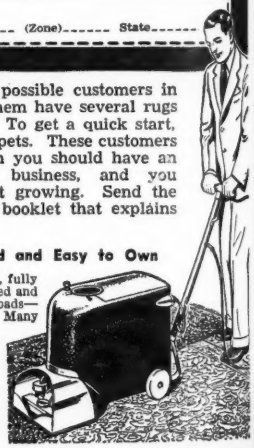

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CONTENTS

[*Continued from page 2*]

SPECIAL FEATURES

How To Survive A Crash 51
By Gold V. Sanders
Air and car accidents needn't kill, says the head of Cornell Crash Research.

Doctor Of Industry's Windpipes 56
By Wilfred Weiss
With a harmonica, tissue paper, a pipe and string, this engineer prescribes remedies for ailing machines.

Engineer's Hydro-Magic Would Turn Arid Palestine Into Fertile Farmland 60
By Willy Ley
Pumping Mediterranean water into the Holy Land is the answer.

New For Your Home 64

MI Tests The Playboy Car 66

Which Will Win—Elements Or Man? 68
We CAN'T control the weather, says Eric Sloane, noted meteorologist.

Flying-Wing Helicopter 72
By Frank Tinsley

New In The Sky 78

Undersea Base To Protect Subs From Atom Bomb 84

Snow Plow—Leaf Remover—Lawn Mower 88

New On The Road 90

Unusual Gadgets Test Products You Buy 92

Convertible Fireplace 96

Tie Your Own Flies 97

Eye For A Spy 102

Heart Attack 104

Half-Pints' Express 105

Weed Burner 107

WINNERS In MI's Fourth Annual Color Photo Contest 108

Slide, Junior, Slide 110

Editor's Workbench 12

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YOUR INVENTION CLINIC

Conducted by Joseph H. Kraus

To facilitate the answering of their mail, readers desiring the advice of Mr. Kraus on inventions matters are requested to observe the following simple rules: 1) Type or write clearly, on one side of the paper. 2) Make sure that your full name and address, including street number and postal zone, if any, are on the letter and all accompanying papers. 3) Mail drawings or photographs flat, not rolled, and include postage if you want them returned. 5) Do not ask questions relating to patent laws. 6) Do NOT send models.

With a background of 25 years of experience in inventions procedure, Mr. Kraus will "call his shots as he sees them" by answering as many letters as possible in this column. His services are free.

Bicycle Trailer Hitch

O. H. Vaughan of Ferndale, Michigan, sends a design of a bicycle trailer hitch on which he wants us to express an opinion.

ANSWER: *You state that you doubt the patentability of this trailer hitch. We are not so sure that the item cannot be protected. On the contrary, we think that you should establish whether some measure of protection might be obtainable by having your attorney report on the results of a search.*

However, we think that the design could be improved greatly. At present it is necessary to remove the nuts holding the rear axle, but the axle is not long enough to take an additional thickness of metal. So either you must replace the axle with another longer shaft or you must provide extending studs. Neither system is good. By modifying the design so that the yoke snaps over the existing axle and secures to the frame, you can accomplish the same rigidity and provide an easier mounting method. Again, although your swivel system will function, it might be less expensive to use a ball and socket arrangement, thus bringing the trailer closer to the bicycle; with a single unit you will have all of the advantages of your dual system. The cost of such construction should not be greater; in fact might be considerably lower than that of your present design.

The only question would seem to be, "Will this article sell?" We think that it will if it is produced and properly exploited. At any rate, the redesign should be attempted and a search should follow. Further action should depend on the outcome of the search and upon your estimate of your own ability to sell the idea after it is patented.

Toy Game

Bernard M. Fisher of San Francisco, California, wants to know about the worthwhile features of a labyrinth style of game.

ANSWER: *Labyrinthian styles of games are older than written history. It is not likely that this feature could be covered as an exclusive design. Printed directions on covered or uncovered labyrinthian paths likewise have been seen on games of the same general style before. These, too, cannot be basically considered. But neither of these statements means to imply that some measure of protection could not be had. In fact, it is likely that if the design is original you could have it protected.*

For the most part, a manufacturer would not be interested in handling this product. He could make another labyrinth, make another set of instructions, use a different method of directing the number of moves which any player is permitted to make, and thus produce a similar or even better game. There seems to be only one way to do this job right and that is to produce the item yourself and attempt its marketing in the same fashion. This involves the risk of a lot of money with little assurance that the public will take to the new game. Of course, if it is accepted and becomes a craze you could get a handsome revenue from its sale, but, in our opinion, the chances of this happening are not good. For these reasons we suggest that great caution be taken. Do not drive headlong into this program without careful consideration.

Kitchen Fume Eliminator

Mrs. Stanley Small of East Kingston, New Hampshire, submits a design for a fume hood for use in the kitchen. She asks our opinion of its possibilities.

ANSWER: *Many people have recommended the same sort of suggestion which you have called to our attention. Our answer to all of them has been substantially the same. This is a wonderful thought if you can make something practical of it.*

But look at what you require to begin with. The kitchen stove must be where there is a chimney. In many homes this is well nigh impossible. In some homes there is no chimney or only one in the living room to serve the fireplace.

You say that your device will fold out of the way and is easy to clean. If it folds out of

[Continued on page 22]

ADVICE *for the* INVENTOR

The United States Patent Office advises the inventor, unless he is familiar with such matters, to employ a competent registered patent attorney or agent as the value of patents depends largely upon the skillful preparation of the specification and claims.

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The Evidence of Invention form mentioned below is offered as a convenience to the inventor in making his disclosure of invention.

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Your Invention Clinic

[Continued from page 20]

the way, chances are that it will not be brought into position when it should be. Again, we doubt that anything of this sort will be easy to clean. Furthermore, unless there is a definite negative pressure in the exhaust, the hood will not do a satisfactory collecting job. In most restaurants where such an article is used, there is an exhaust fan at the far end of the system. This fan and the tubes leading to it usually get gummed up and are difficult to clean.

If someone could solve this problem with some sort of an electrical gadget, which preferably should occupy only a small space against the wall behind the range, he or she will earn the lasting gratitude of the entire family and will also reap a substantial income for the rest of his or her life. The solution should be possible, but is likely to be somewhat tricky. There seems to be no reason why the smell of frying onions or fish, or the odor of cooking turnips, sauerkraut or cabbage, should be allowed to permeate the home while the grease and steam raise havoc with paint, blinds and curtains. Suggest that you give this a lot of extra thought, then follow with some real experimental work. The correct answer should prove profitable.

Collapsible Luggage Carrier

Roger W. Tripp of Oakland, California, asks us some questions about a collapsible luggage carrier.

ANSWER: *This idea has some points to recommend it, but, in our opinion, needs much redesigning and a more careful examination of the costs of production. While we are in favor of the price range which you have set for the item, we at the same time are doubtful that you could make the article and sell it for the price quoted.*

You recommend too many different methods for the construction. You must settle for one or the other of them. Again, you recommend the use of sliding parts and wing-nuts. No reason for either. The entire idea could be encompassed by a lazy tong style of construction which would fold into a smaller pack, and require no mechanical expert to make it ready for use.

Although you state that you are handicapped to make a model, your penmanship indicates that the handicap is not sufficiently great to prevent your doing the work. It is not essential that the model be made of the materials which will enter the final construction. You could develop a very workmanshiplike model entirely from cardboard strips held together with eyelets at the yielding points and glued or stapled together at the points of

[Continued on page 24]

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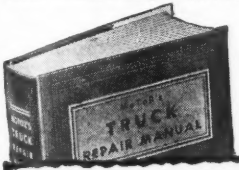

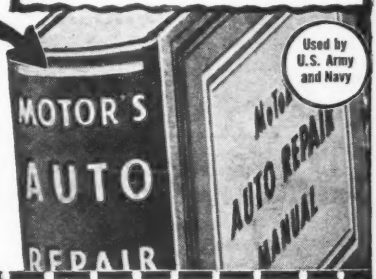

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The inventor who believes he has a new and useful invention, and finds himself in need of advice, should consult a competent registered patent attorney or agent.

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Your Invention Clinic

[Continued from page 22]

rigidity. Suggest that you toy with some of these cardboard models and use match boxes or candy boxes to represent the luggage. But, make everything to proper scale. Then you will be able to envisage what the size and shape of the full model will be. We would not recommend any other action until your plans have crystallized into something more concrete than at present.

Non-Colic Nursing Bottle

Lt. Dean E. Lange of Phoenixville, Pennsylvania, sends us a design of a bottle to be used for nursing babies and states that the design should prevent colic because air is not permitted to be sucked in with the milk.

ANSWER: *Just nine years ago on a radio dramatization of this department, an inventor presented a baby's milk bottle somewhat similar to your design and claimed that it prevented colic. But the baby doesn't suck air from a bottle held in proper feeding position. The air is at the top of the bottle and does not mix with the milk.*

By pinching the nostrils together it was established that drinking from the bottle was possible with difficulty only. By other methods it was proven that the very act of swallowing caused air to be carried into the stomach and lungs. It is this accumulated air which causes burping and the condition occurs even with breast-fed babies. Infants cannot release the air as readily as can adults, and even many of the latter offer excuses for their many burps.

There is one way to stop mixing the air with liquid or solid food going into the stomach and that is to siphon the material directly to the bottom of the stomach while permitting the air to escape at the same time. But who wants to be fed that way all of the time?

Static Balancer

Stanley E. Phillips of Vancouver, B. C., Canada, wants our comments on a static balancing tool of his design.

ANSWER: *No doubt you have come across many instances where the static balancer as designed by you would prove superior to a pair of knife edges. Frankly, we cannot see the superiority. With knife edges you can get results without making any adjustments. With your system, adjustments must be made whenever another diameter of work is placed on the balancer. Neither do we think that your design will prove as sensitive as a knife edge.*

However, this is merely an opinion. You may have proved to your own satisfaction that

[Continued on page 37]

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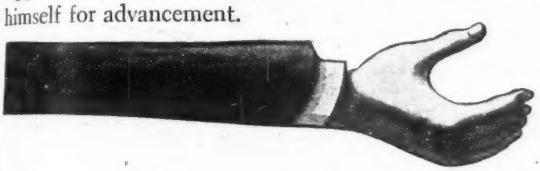

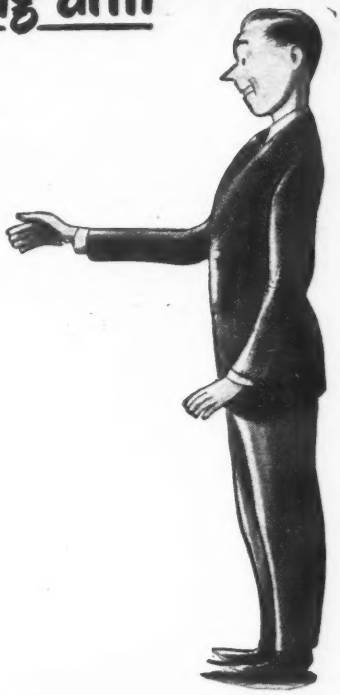

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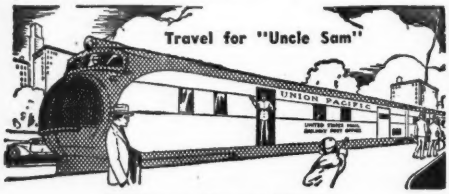

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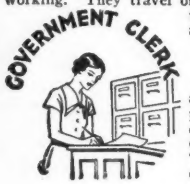

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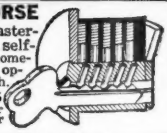

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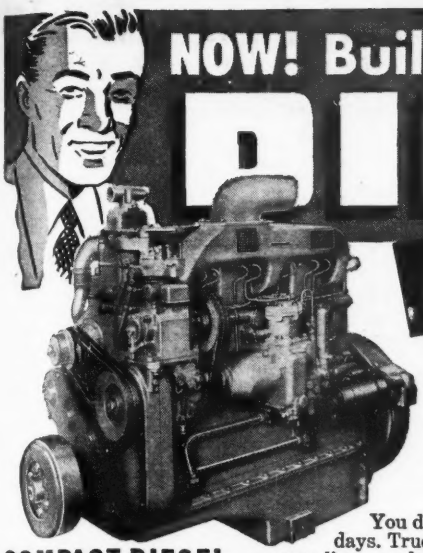

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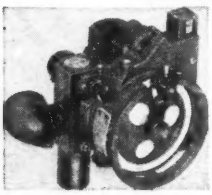

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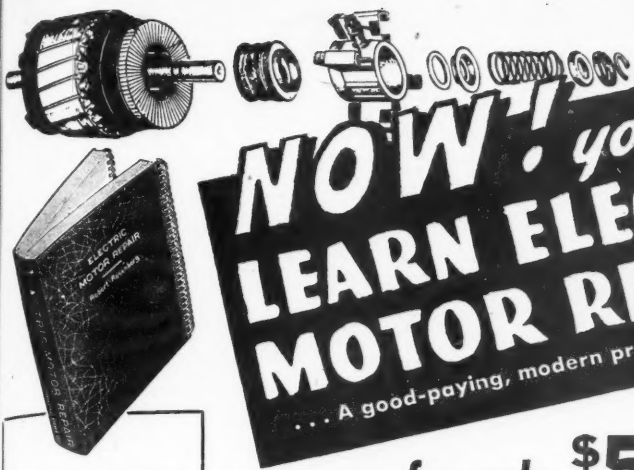

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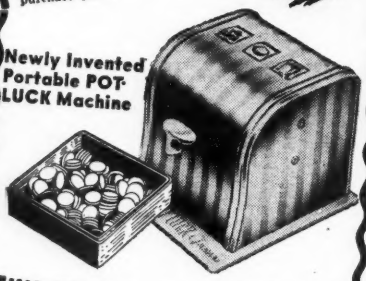

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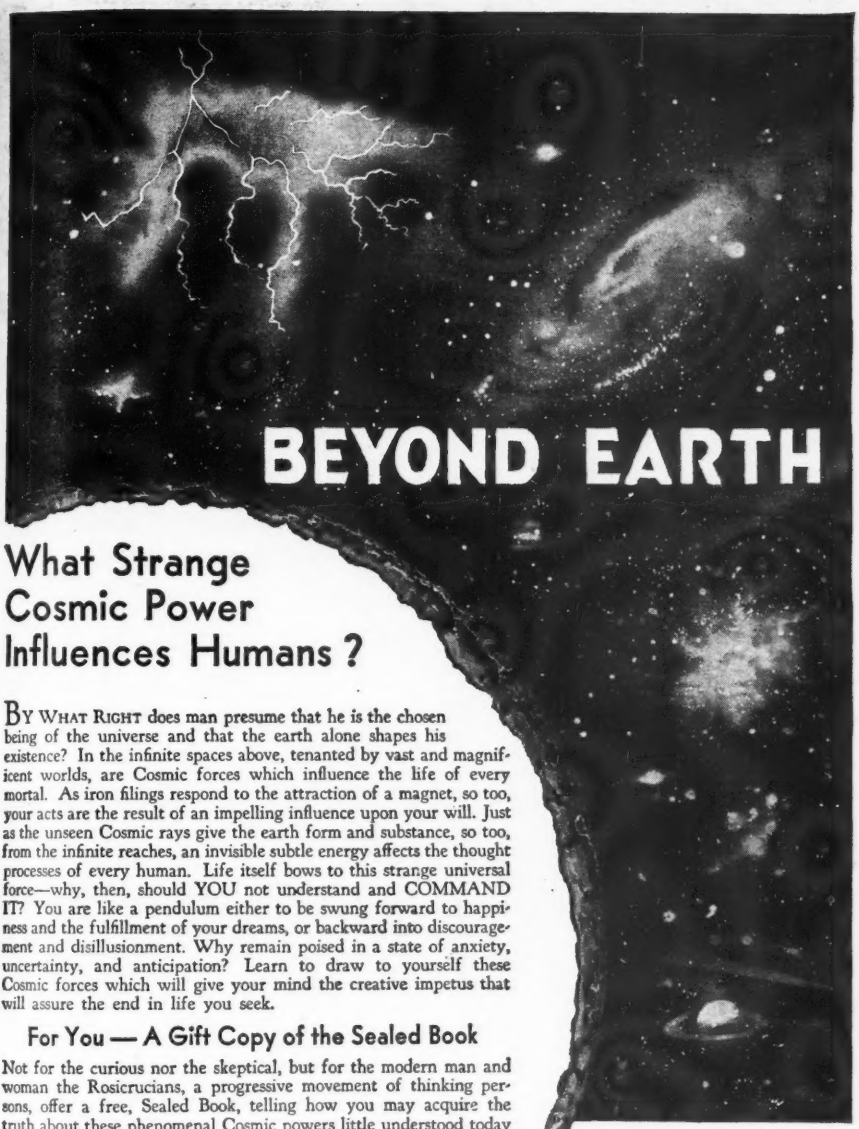

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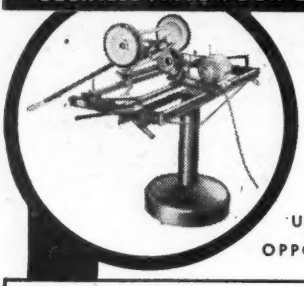

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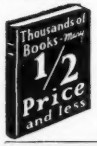

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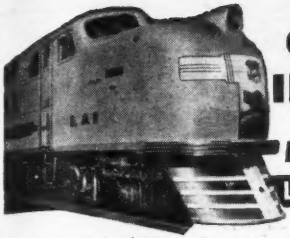

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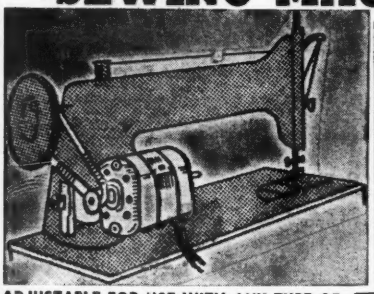

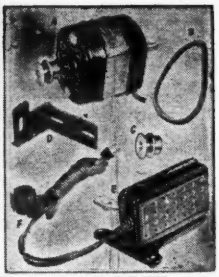

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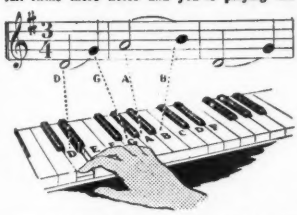

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Every retail store, every large manufacturer, every advertiser in the United States is a prospect for one to 100 or more Business Builders. Space does not permit printing all facts. But if you want big, quick profits in volume you never dreamed of you'll get the facts in a hurry! Don't send a penny. Just your name on a penny post card brings Free Selling Outfit. Do this quick—for the biggest cash cleanup in the history of Direct Selling!

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Ugly BLACKHEADS OUT IN SECONDS

Keep your complexion free of Blackheads this new way — look attractive instantly!

Try VACUTEX Blackhead-Remover

$1.00

The amazingly effective Vacutex extracts Blackheads automatically —WITHOUT squeezing the skin or injuring tissues. Easy to use with three fingers. It reaches Blackheads anywhere. Try it 10 days and if not delighted return VACUTEX and your money will be refunded.

AT YOUR DEALER OR USE COUPON

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19 West 44th St., New York 18, N. Y.
☐ Enclosed find $1. Send postpaid.
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Send me your FREE Bulletin on Meat Cutting and Meat Merchandising. No obligation. No Salesman will call.

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City ..... State .....

Your Invention Clinic

[Continued from page 24]

your balancer is everything you expect of it and can be employed where it is not possible to use the knife edges. If this is your conviction, we would suggest that you have a search made to determine possible patentability.

We also are of the opinion that the device could be redesigned so that more speedy centering is possible. The lateral guides could have knife edges instead of wheels. Because these edges will not be called on to support any weight, the stock of which they are to be made need not be very heavy. If these edges are located on interconnected levers it now becomes possible to get instant centering without manipulating for adjustments. Only two motions would be needed even if the shaft is of a tapering nature. Or, even these could be eliminated by having the centering arms made operable through springs. Then, if desirable, spring tension could be relieved by a small kick lever. So, before applying for a patent, we suggest that a little more study be given to the construction and an attempt be made to simplify operating technique.

Centrifugal Transmission System

William A. Petrosky of Latrobe, Pennsylvania, sends drawings and description of the operation of a centrifugal transmission system for use on automotive devices.

ANSWER: *Sorry, but we do not understand the reasoning behind the supposed operation of your system. It appears true that when the ring is in the position shown by your solid lines in your diagram the impeller will deliver its full volume to the driven blades.*

It seems to us that when the flow is obstructed there will be a smaller transfer of the fluid, hence a lessening of applied power to the driven blades, while the engine will run more freely because it is not called on to do so much work, but rather just circulate the liquid. Just imagine that the ring is closed completely. With your line of reasoning you should get maximum power at this instant and the engine should run most freely. The latter part of this statement is true, but you will get no application of power to the rear wheels at all. And if this finding is correct, at which point between the slightly open and the closed position do you get maximum torque? Certainly not just before complete shut off. Now tell us, which is the correct interpretation, yours or ours?

Automatic Plane Control

E. W. Womble, Jr., of Hereford, Texas, sends a design for an automatic throttle control for use on light airplanes.

[Continued on page 39]

How to Make YOUR Body Bring You FAME

Instead of SHAME!

Will You Let Me Prove I Can Make You a New Man?

This is an actual snapshot taken at the beach.

I KNOW what it means to have a body that people pity! I was once a skinny, 97-lb. weakling—such a poor specimen that I was constantly self-conscious, embarrassed. But later I discovered the secret that turned me into the holder of the title, "The World's Most Perfectly Developed Man." I'd like to prove that the same system can make a NEW MAN of YOU!

7 DAY TRIAL OFFER

I don't say I can do all this for you in 7 days. But I DO want to prove I can show you enough results in even THAT short time to convince you that my system of *"Dynamic Tension"* will give you the kind of body you have always longed to have!

Do you want powerful shoulders—a fine, deep chest—biceps like iron—arms and legs rippling with strength—a stomach ridged with sinewy muscle—a build to be proud of? Then let me prove that *"Dynamic Tension"* is what you need.

FREE BOOK It costs only a stamp — or a postcard—to mail coupon below. I'll send my new, free book, "Everlasting Health and Strength." It tells about my *"Dynamic Tension"* method; shows, from actual photos, how I have developed my pupils—explains about my 7 DAY TRIAL OFFER. Charles Atlas, Dept. 6B, 115 East 23rd St., New York, N. Y.

Mail Coupon Now for FREE Book

CHARLES ATLAS, Dept. 6B
115 East 23rd Street, New York, N. Y.

I want the proof that *"DYNAMIC TENSION"* will help make a new man of me—give me a healthy, husky body and big muscle development. Send me your free book, "Everlasting Health and Strength."

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Your Invention Clinic

[Continued from page 37]

ANSWER: *We are not partial to this design. There are too many adjustments which must be made, yet this design is supposed to make automatic one of these same controls. In any tight, quick turn, your automatic control device would have to be released first. For aerobatics this design definitely is out. What, then, do you gain with this system? Maybe you could discover ways of overcoming the defects. This is possible but will require much redesigning. And after you succeed you still will be confronted with the problem of having the control accepted by the builders of light planes. Recommend that you give the entire problem and its future development much further thought, with particular emphasis on the final distribution of your product.*

Prospecting Device

O. O. Reynolds of Jackson, Michigan, wants us to tell him the number of a patent granted before 1924 to a German inventor for an electrical prospecting device.

ANSWER: *In view of the fact that only you would be able to recognize the item in which you are interested, would recommend that you look through the Patent Index at your library. You may be able to get the patent numbers of all geophysical devices from the Patent Office. Also, if it still is available, would suggest that you get a copy of "Geophysical Methods of Prospecting," Department of Commerce, Bureau of Mines, Technical Paper 420, published in 1927. This was available from the Superintendent of Documents, U. S. Printing Office, Washington, D. C., for 10 cents.*

Emergency Tire Chain

George Schulte of Rochester, N. Y., has applied for a patent on an emergency tire anti-skid chain. He senses that there is something wrong with the idea but doesn't know what it is. Manufacturers to whom it was shown reply that they are not interested.

ANSWER: *Of course, your idea for an emergency tire chain will work. One of the reasons why manufacturers may not be interested is that you do not yet have a patent. At any rate, your letter speaks of an application, and says nothing about a grant, nor does it disclose the claims which have been allowed.*

But apparently you have not investigated the field, otherwise you would not have applied for a patent on this design. Emergency double chain links which strap to any wheel with an ordinary canvas belt are available. They can be applied instantly, need no tools

[Continued on page 41]

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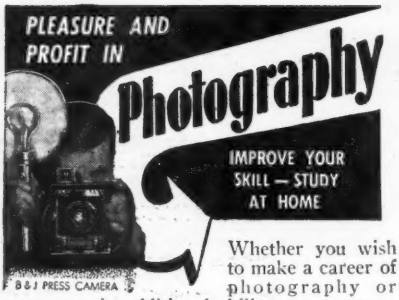

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Your Invention Clinic

[*Continued from page* 39]

to tighten, can be removed even when frost covers them, and probably cost half as much to make as does your item. Perhaps this is the reason why manufacturers are not interested in your product. You should have queried us first; we might have set you straight. The only thing you can do now is to try to improve the article, cut manufacturing costs, modify it to make it hand-operative, instead of requiring some sort of tool to tighten the nut and effect its removal.

Miners' Lamp

Gene Carpani of Gillespie, Ill., states that the storage battery of the miners' bug light causes bruises because the weight of the battery is centralized at one spot. He wonders if the battery could not be distributed along the belt.

ANSWER: *A very good idea. But the distribution of the weight of batteries around a belt has been employed for many years. It was found even in the so-called electric health belts which contained a continuous band of wet cells at first, later replaced by a band of dry batteries.*

About the only thing which you can do is to try to encourage the manufacturers to try to distribute the weight. It should make most miners happier.

Toothpaste Tube Closure

Lt. Dean E. Lange of Phoenixville, Pa., thinks he has the answer to the knotty problem of closing paste tubes.

ANSWER: *The paste container closure which you have designed suffers from the same defects which have characterized other devices designed for similar purposes.*

Look at it this way: The slide which shears off the cream and closes the opening has a certain thickness of metal. It stands to reason that the paste which is sheared off will fill the hole in the slide, or if the slide has no hole, it will pack in front of the shearing knife or slide to a depth equivalent to the thickness of the metal. Now, this cream must be removed and the hole should be cleaned. How is this to be done? It can be wiped off with the brush, or washed off after use, but neither method is satisfactory or desired. If the paste should harden in this position the slide becomes difficult to move. In any case, paste sticking to the slide becomes laden with dirt and looks as messy as it will be unsanitary. Although you have modified the general thought, you have not established a better form of closure.

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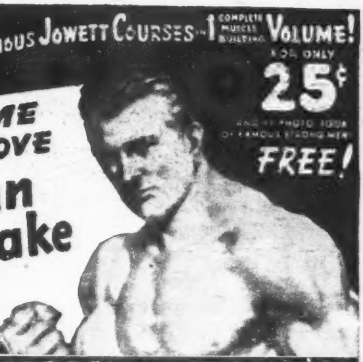

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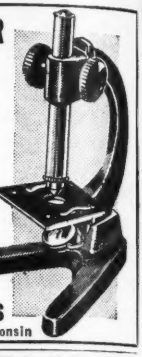

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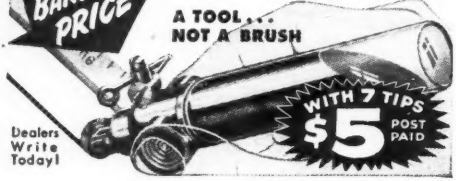

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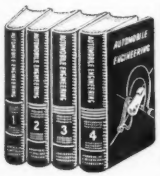

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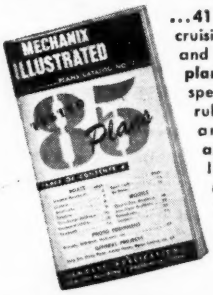

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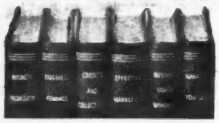

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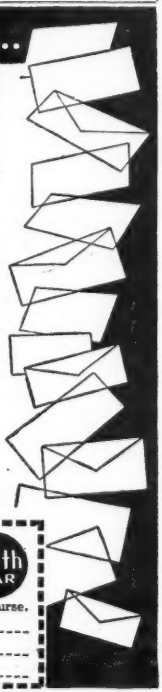

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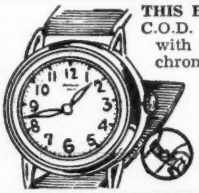

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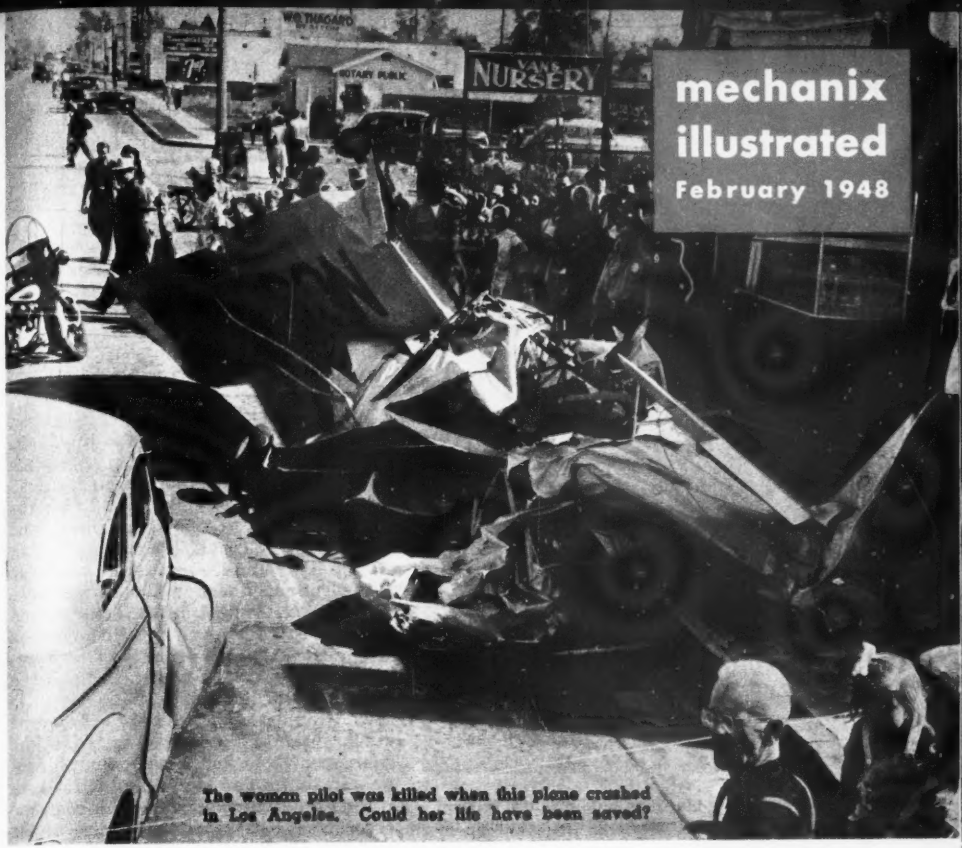


mechanix illustrated
February 1948

The woman pilot was killed when this plane crashed in Los Angeles. Could her life have been saved?

How to Survive a Crash

Car and plane accidents needn't kill! Most deaths can be prevented by eliminating shock hazards within the vehicle itself, says Hugh De Haven, Director of Crash-Injury Research, Cornell Medical Center.

BY GOLD V. SANDERS

ART'S friends at the hangar gasped. The wheels of the little plane snagged an electric wire. The plane whipped nosedown, crashed flat against the earth.

The witnesses raced to the scene. A man crawled out of the crumpled cabin. Then Art, the pilot, was pulled out—dead.

Two men rode that plane into the ground.

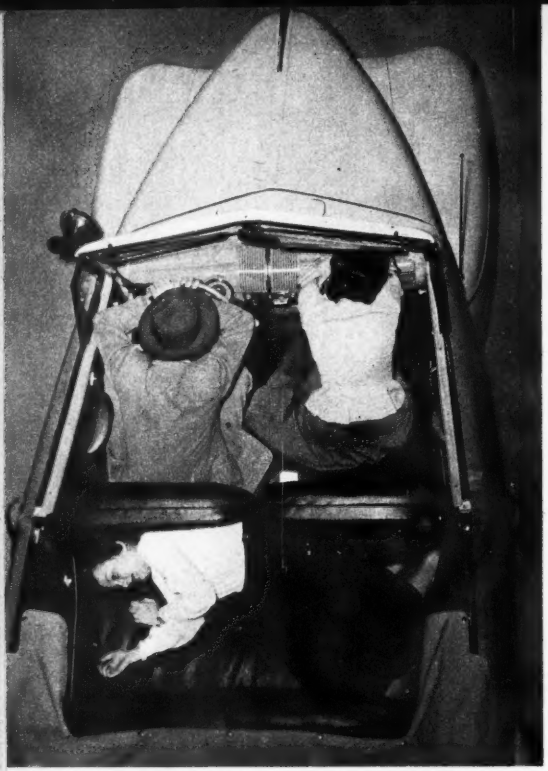
George, the passenger, got only a bump on the forehead, a bruise on the cheek.

Why was one man killed instantly, the other barely hurt?

We can ask that of hundreds of airplane and automobile accidents. In every case the survivor says, "Boy, was I lucky!" And observers agree.

But scientists at the Crash-Injury Research project at the New York Hospital-Cornell Medical Center have taken another view of such accidents. By application of sound research and analysis these scientists have discovered facts that already have saved many boys like Art from death.

They have found that in a plane the cabin itself causes many of the crash



You can save your life in an auto crash. If driving, bend over the wheel. On right, lean against the dashboard. In the rear, lie down facing backward.

fatalities. Get rid of the cabin's death-dealing features and you've called two strikes on the Grim Reaper.

Fantastic facts about the ability of the human body to withstand crash forces have been found. Give the body half a chance, and it will take a terrific beating before giving in.

Art was killed by the flight instrument directly ahead of him. His friend George made a dent three inches deep in the sheet-metal instrument panel when his head jammed into it. That impact against the metal, however, merely bumped his head—and saved his life.

Cornell researchers studied 800 private-plane crashes and found almost half of them told a similar story.

Hugh de Haven, director of the Crash-Injury Research program and a pilot himself, says he would rather have a panel of sheet metal than a thick mattress in front of him to cushion a crash. He bases his opinion on a mass of data. Hundreds of photos show how fliers have been thrown against metal dashboards but have escaped grave injury.

"It is almost impossible to break the human skull with sheet metal which yields," he says. "But let a man's head strike a solid object like a flight instrument fastened to this sheet metal, and the skull will crack like an egg."

Other dramatic accidents back up these conclusions, Mr. De Haven says. A man fell almost fifteen stories and *didn't break a bone.* Why? He landed on the hood and front fenders of an automobile; these sheet-metal surfaces "shock-absorbed" his fall.

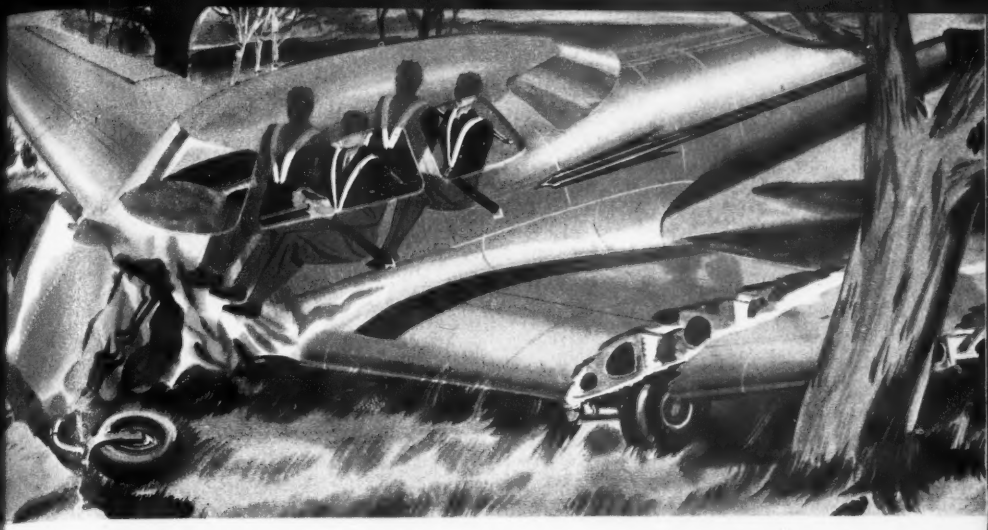
That's no miracle, either, the crash researchers say. The answer is that the human body is so marvelously engineered that it can stand terrific forces—*if they are not localized.* In this case, the force was distributed over most of the man's body. The sheet metal was caved in as much as eight inches. The crash force was exerted only a fraction of a second, but during that instant of impact the shock was being rapidly dissipated by the metal's "give" or stretch.

A mattress on the street would not have saved the falling man. It would have compressed too quickly and easily to break the fall against the unyielding pavement.

As Mr. De Haven explains, sheet metal starts to work at the first contact. It stops the force gradually—even though the entire action is split-second.

A woman jumped from the tenth floor of a New York apartment house. She landed flat on her back in a small garden plot. Another suicide? No—only one ankle bone broken, a few bruises. The impression of her whole body was left in the soil, five inches deep, showing that the distribution of the force of the fall over a large area of her body had saved her life.

Hugh de Haven plans to install safety belts in his car. Ideal device, he says, is shoulder harness like that worn by our fighter pilots.



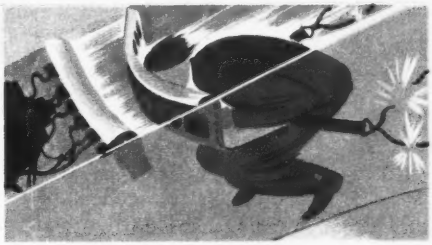
De Haven's "safe" plane would have strength concentrated in the cabin. Wings would get progressively weaker toward tips. Landing gear would be designed to bend and absorb shock.

A third leaper plunged an even greater distance. Luckily, he landed on the top of a parked car, his head and shoulders taking all the force. The top was deeply dented, but the man suffered only a broken collar bone; the sheet metal was the savior again.

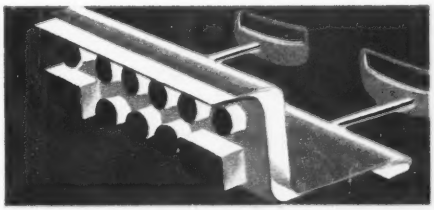
Another attempted suicide failed because the falling man struck a sheet-metal ventilator.

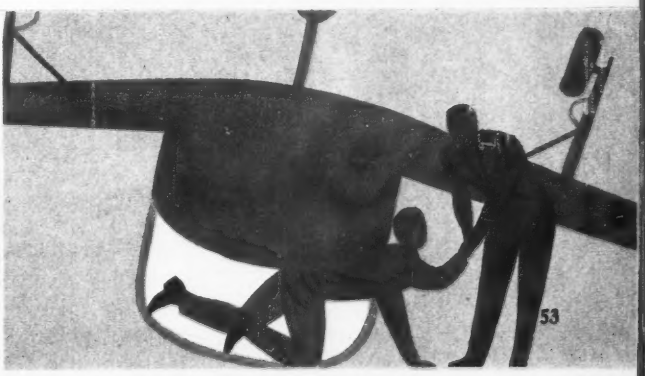
These and many other seemingly miraculous escapes have been studied at the crash-injury project. They are more valuable in crash-injury research than plane crackup data because velocities of falling bodies can be calculated exactly, and because the whole accident is simpler and easier to analyze.

When a flier's skull strikes a sheet-metal dashboard, the "give" generally is sufficient to distribute the blow over a large part of the skull. The stop is relatively gradual. On the other hand, if even a one-pound instrument is anchored in the panel, the instrument will hit the head like a missile moving at the speed of the plane on impact. Actually the instrument has stopped, and it's the flier's head that's still traveling. The net effect on the

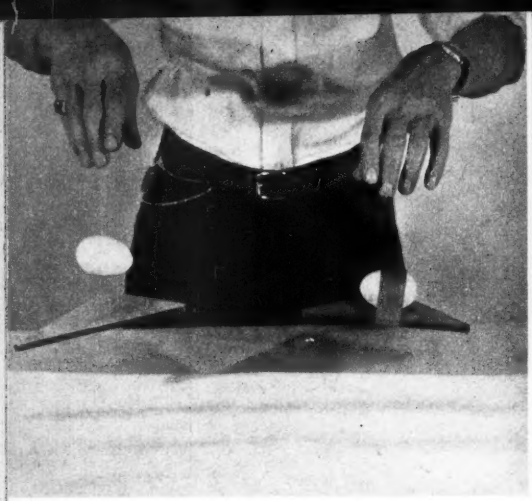


Instrument panel would have an outside shell of sheet metal, with instruments fastened behind it on springs and rubber. In a crash, instruments would fly loose into an empty space in back of the engine. Sheet metal would cushion the shock.





Present low-wing planes offer little protection in turn-overs. Sturdy top of De Haven's plane would prevent cabin collapse.



Eggs were skulls in collision experiments performed for MI's camera. One egg was held above a strip of metal. Then egg and metal were dropped on a table. Egg hit the metal and broke.

In second test, an egg was taped to the metal strip, and both were dropped. The egg, in contact with the metal, escaped impact shock and remained unbroken. Your head can escape, too.

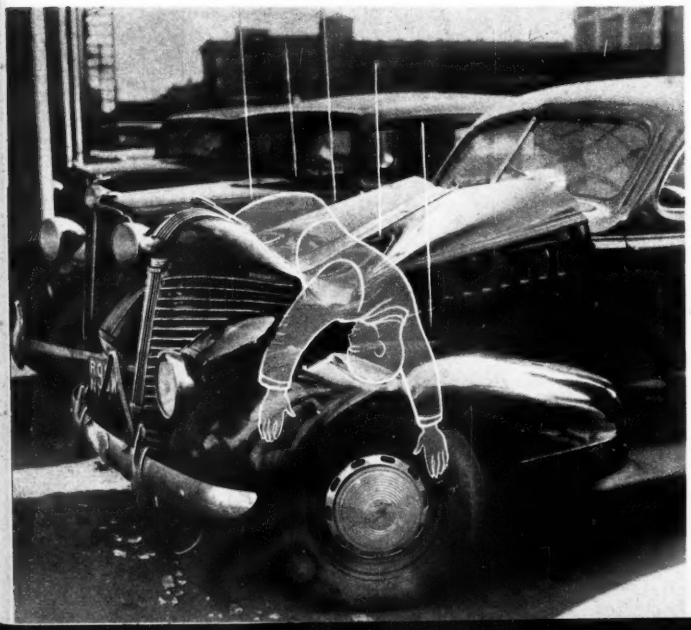
flier's head, unfortunately, is the same.

Private planes usually crash at speeds no greater than that of the woman who fell ten stories. The great majority of these crashes Mr. De Haven calls "survivable accidents." When one man comes out of a wreck practically unhurt, the accident itself is survivable even though all the others in the plane are killed.

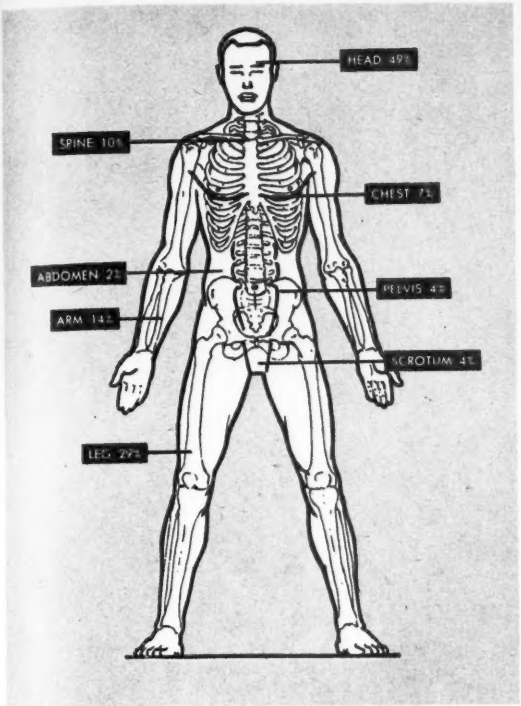
In the investigation of 30 accidents involving planes with a side-by-side seating arrangement, pilot and passenger were equally liable to serious injury. In 30 accidents involving tandem planes (one seat behind the other with the passenger in front and the pilot in the rear), the passenger suffered severer injury. The back of the front seat and the passenger's body offered a protecting barrier.

In view of what has been learned from this first systematic study of private-plane crashes, Mr. De Haven stresses that many crash deaths have been needless. We have failed to put to use plain facts about crash safety, he declares. While we have made great efforts to improve the speed, payload and general charm of our planes, we've neglected to give a little thought to making crashes *less dangerous*. Everyone has taken a fatalistic attitude on plane accidents—if you crash and live, that's just your good luck.

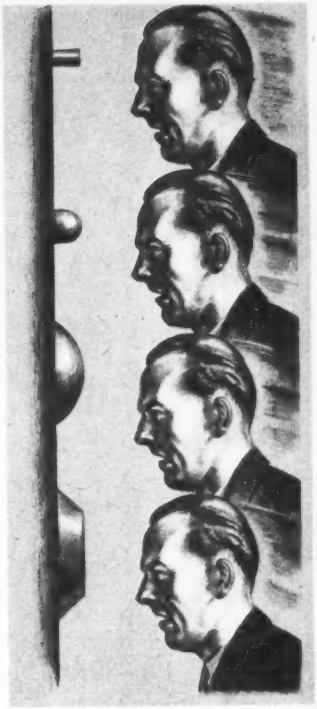
In an accident, the most vulnerable part of the body is the head. We can survive accidents with broken arms, legs, etc.; these are relatively unimportant, but a solid tap on the head is all that's required to put the human mechanism to sleep for keeps. Cornell's research shows that this type of injury accounts for more fatalities than all others combined. Therefore, our first consideration must be to protect this



A man fell 137 feet and not a bone in his body was broken. He hit a car's sheet-metal hood and fender and the force of his fall was distributed over a large area.



In 30 survivable lightplane accidents studied, this was the injury distribution. Nine were fatal. The head was by far the most vulnerable.



Reading upward, research chart shows relative danger of surfaces inflicting serious injuries to the head.

part of the flier's body from injury.

How can we do this? The answer is simple: remove all lethal objects from the vicinity of the head.

In a typical crash, the seat belt halts the body's forward motion at the hips. The upper body jackknifes, with the head snapping forward like an apple on the end of a long stick. If there is anything hard, sharp or unyielding close enough, the head will bash against it.

Here's what Mr. De Haven suggests to designers and manufacturers:

1. Put the seats farther back or the instrument panel farther forward.

2. As an alternative, mount all instruments on a separate panel behind a sheet-metal dashboard with holes through which the instruments can be read. Install the instrument panel so that it can fly forward out of head range when a crash occurs.

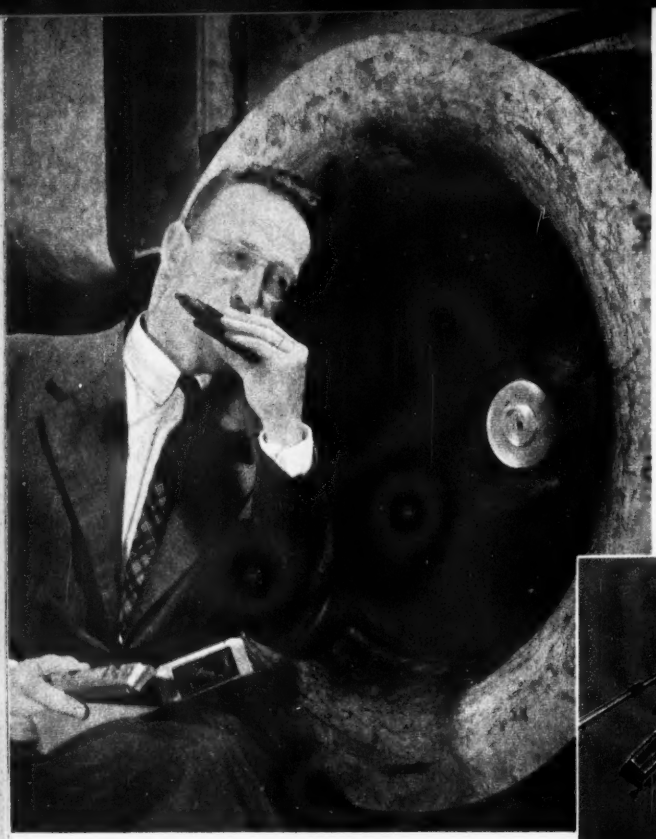
3. Remove bracing members as far as possible from head range of the pilot and passenger. Design these members so that they will buckle outward, instead of inward. (This might be done by making them oval rather than round in cross section.)

4. Hinge the front-seat backrest so that the rigid top of the seat will swing forward out of range of the head of the person in the rear. (This has been the principal cause of serious injury to back-seat fliers.)

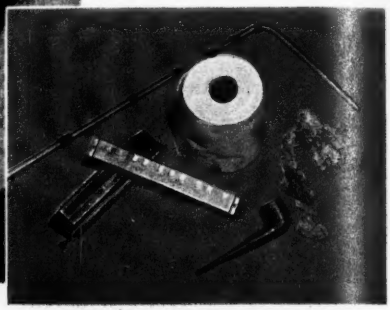
These are suggestions for the engineers. But fliers themselves can learn a lot about safety from the Cornell findings. Knowing that the greatest hazard is to the head, pilots should protect their heads by using shoulder harnesses, now standard equipment in Army and Navy fighters. Sure, it's uncomfortable! But it will prevent your upper body from jackknifing in a crash, and will keep your sensitive cranium out of harm's way.

Almost as effective is the safety belt. False ideas about danger from the restraining action of safety belts too often have prevented their use in crashes, according to Mr. De Haven.

"Pilots and [*Continued on page* 80]



Doctor of Industry's Windpipes



THE DOCTOR'S TOOLS

With a few simple tools, Jack Cassie provides manufacturers with a remedy for one of their million-dollar headaches.

BY WILFRED WEISS

JACK CASSIE'S harmonica has saved American industry millions of dollars. Sometimes he also uses a piece of tissue paper or a piece of string. It never looks very serious or important, but there are engineers and industrialists all over the country who swear that Cassie and his gadgets are a combination akin to genius.

A typical example of why they think he is so valuable started with the recent call for help from a southern cotton mill. The mill owners, after checking, had come to the conclusion that their power plant was below its peak of efficiency. They called in a contingent of engineers who made a thorough study of the power plant, and then recommended a course of action involving reconstruction. If materials had been available, their suggestions would have cost the owners at least $250,000.

But an inspired official of the mill wired Westinghouse, who had made most of the plant's machinery, for help. Their reply was to send Jack Cassie and his harmonica to the mill.

As he warmed up his harmonica Cassie explained that nine times out of ten a loss of power plant efficiency can be traced to the air ducts. He calls it "congestion of the industrial windpipe."

Jack Cassie's first detective job is to search for excessive noise in the ducts. Whirring fan and air slipping through

If the string swirls about, instead of being drawn straight out, Jack Cassie knows there's something wrong with this duct.

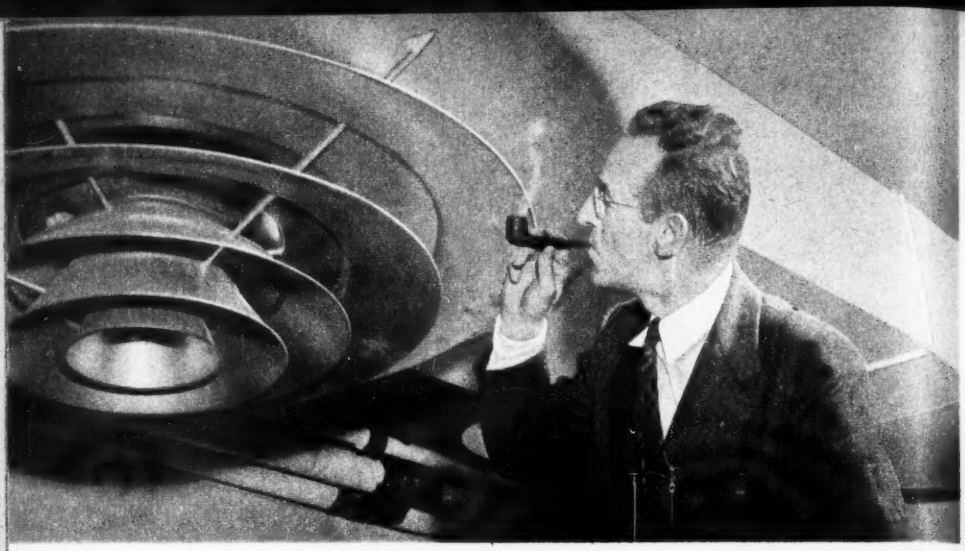
Photos by Kurt Gunther

He quickly locates invisible leaks in cold-air ducts with tissue paper. The paper is drawn to the crack, and holds.

pipes should have a normal sound that to Cassie's ear proclaims all is well, and if the sound is suspicious in any respect he must make a thorough investigation.

The fan is usually not guilty, but Cassie starts with it, playing his harmonica up and down the scale until he matches the pitch of the noise. If the pitch of the fan matches the pitch of the noise, the fan is causing the trouble. If they don't match, the fan is innocent.

His next step, then, is to check the rest of the duct system and find where and what the trouble is. Using his string, paper and other unorthodox tools, he generally can spot the trouble in an hour or two.



By merely smoking his pipe into the intake duct and noting the way the smoke enters, he knows whether the air flow is at maximum efficiency.

In the case of the southern cotton mill it was not the fan, and his prescription was the installation of curved sheets of steel in the ducts, eliminating sharp turns and corners. He also recommended that sharp changes in the ducts' diameter be eliminated; that is, made either uniform or gradual.

The changes Cassie suggested were made within a few days. The plant's production of steam showed an increase of 50,000 pounds an hour; the life of the fan wheels was prolonged by 25 to 30 times; and this increase in efficiency was accomplished with less than half the electricity formerly consumed. The cost was $1,000.

When you compliment Cassie on what many engineers call his industrial genius, especially when you express wonderment at his being able to do for a few dollars a job that looked as if it would cost many thousands, he grins and says, with an almost imperceptible wink, "My ancestors were Scottish, you know. It's natural for me to save money."

There are other ways of doing the job he does with a harmonica. It can be done with a frequency analyzer, a cumbersome and very expensive piece of machinery. Or it could be done with 88 tuning forks. Aside from their expense, their size and clumsiness makes Cassie unhappy. He travels a lot from one troubled plant to the next—between 20,000 and 40,000 miles a year—and the idea of playing nursemaid to a huge, clumsy piece of machinery makes him unhappy.

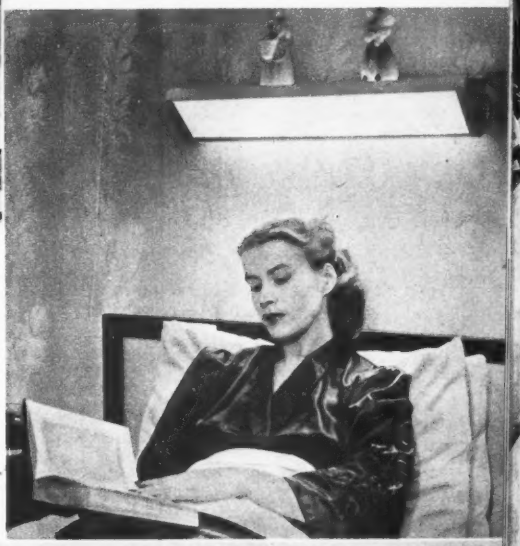
Applying his professional principal to his personal life, the system he has devised makes it possible for him to get maximum efficiency with minimum annoyance with only a small suitcase for his clothes and his few gadgets in his pockets.

There are occasions when he'll arrive at the "bedside" of an ailing plant and find that, after he has ascertained where and what the noise is, [*Continued on page* 82]

Suspecting a leak in a duct carrying warm gasses he introduces skywriter's smoke into the system—and a telltale stream escapes to mark the spot.

Extremes meet in Radiolympia—London's National Radio Exhibition—where girl admires smallest and largest radios shown. Big one is a 43-tube radio-phonograph set which will automatically switch on any of three pre-selected programs. Its remote control stands in foreground.

Fighting Ring can now be floored with a cellular rubber mat which, placed under the regular canvas, absorbs shocks and will help prevent boxing injuries.



Fluorescent Unit by Sylvania contains two 20-watt lamps behind a diffusing panel of frosted, ribbed glass. Fine for bedroom, living room or kitchen—for either specific use or general illumination.

Vibrationless Mower of revolutionary type has blades capable of moving back and forth at 1500 rpm. Its "roto-drive" does away with wrist pins and uses a straight crankshaft without offsets.

Engineer's Hydro-Magic Would Turn

Arid Palestine Into Fertile Farmland

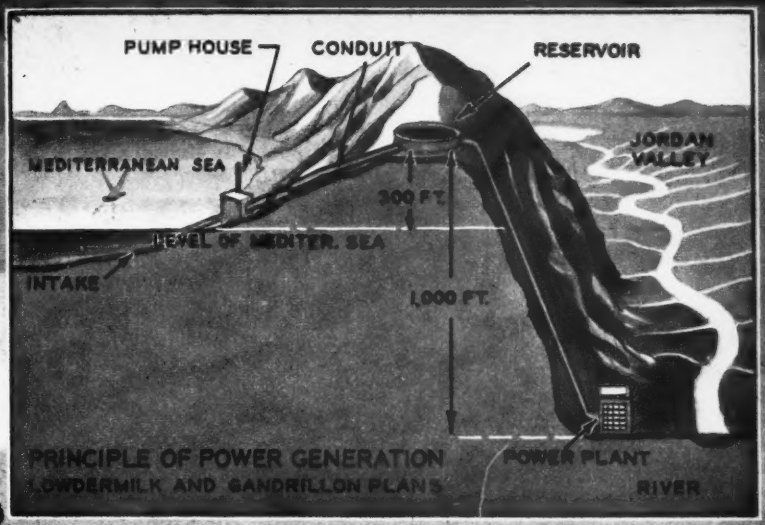
American scientist says his plan would double the productivity of the Holy Land and give bountiful living to 2,000,000 additional Jews.

BY WILLY LEY

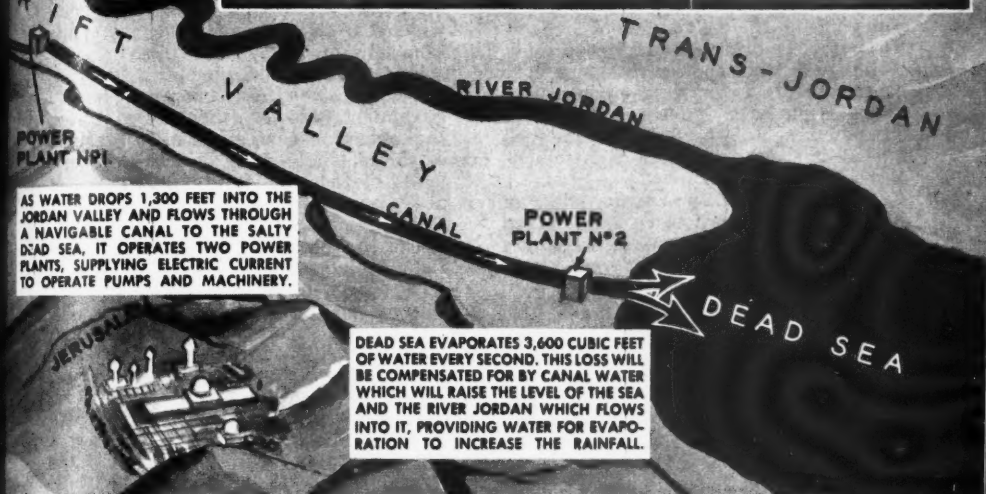
PALESTINE *can* support double its present population. The arid Holy Land could become a bountiful "Promised Land" for some 2,000,000 displaced persons, now starving in Europe's war ruins or huddled behind barbed-wire stockades in Germany and Cyprus.

But this can happen only if Palestine gets $250,000,000 for a project to water its barren lands. Right now, Palestine can't support a greater population than its current 600,000 Jews and 1,100,000 Arabs. Additional immigrants, such as the much-disputed 100,000-a-year quota, would only intensify its acute political and economic problems.

If Palestine should get as much water as its thirsty soil could drink, 4,000,000 people could flourish there in peace and prosperity, in contrast to the bleak outlook that now confronts most

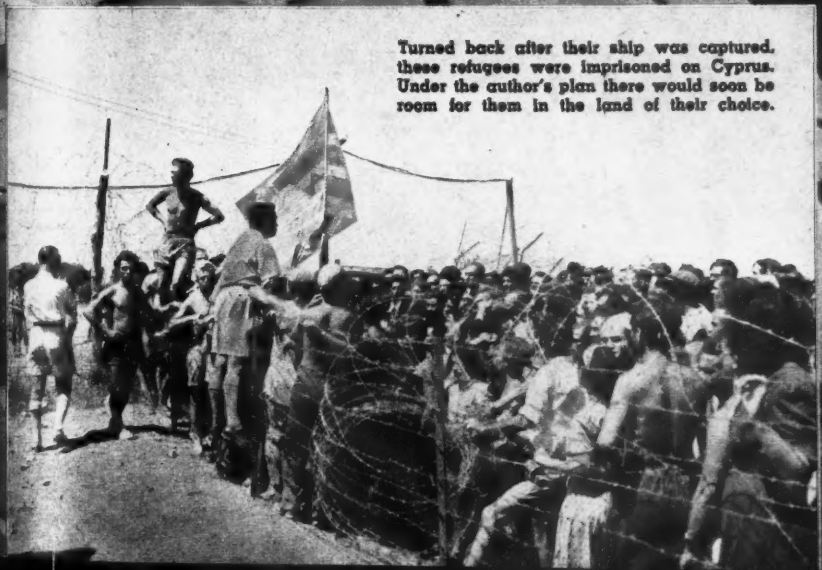


PRINCIPLE OF POWER GENERATION
LOWDERMILK AND GANDRILLON PLANS



AS WATER DROPS 1,300 FEET INTO THE JORDAN VALLEY AND FLOWS THROUGH A NAVIGABLE CANAL TO THE SALTY DEAD SEA, IT OPERATES TWO POWER PLANTS, SUPPLYING ELECTRIC CURRENT TO OPERATE PUMPS AND MACHINERY.

DEAD SEA EVAPORATES 3,600 CUBIC FEET OF WATER EVERY SECOND. THIS LOSS WILL BE COMPENSATED FOR BY CANAL WATER WHICH WILL RAISE THE LEVEL OF THE SEA AND THE RIVER JORDAN WHICH FLOWS INTO IT, PROVIDING WATER FOR EVAPORATION TO INCREASE THE RAINFALL.



Turned back after their ship was captured, these refugees were imprisoned on Cyprus. Under the author's plan there would soon be room for them in the land of their choice.

Jewish farmers in the Negeo, watering their fields by means of a trailer-borne tank. The farming lands of agricultural Palestine are chronically water-thirsty.

of its 1,700,000 inhabitants. The problem is to engineer the reclamation of the land, badly neglected for centuries.

Hardly another spot on the globe is so made-to-order for modern engineering's hydro-magic as is Palestine. And there is no other spot on earth that needs such magic as badly as does this much-harassed Holy Land.

Dr. Walter Clay Lowdermilk, an American conservationist, has worked out a plan that can make Palestine's 9,000 square miles of semidesert bloom again with fertile farmland.

To understand the problem of reclaiming Palestine, first let's glance at its topography. The chief geographical feature of the land is the Jordan River Valley. Geologists call it a "rift valley"—a valley where large stretches of land have sunk far below the level of the surrounding countryside. The Dead Sea, into which the Jordan flows, is a part of the same line of geologic weakness.

For all its Biblical fame, the Jordan is not impressive. It is a slow and muddy stream in its lower reaches, and during the dry season can be forded at hundreds of places. The Jordan rises in the highlands of Lebanon several hundred feet above sea level and runs into the Dead Sea, 130 miles south on the map.

The first lake formed by the Jordan, Lake Huleh, is only slightly above sea level. The next lake to the south, Lake Tiberias, the Bible's Sea of Galilee, is 686 feet below sea level. Sixty-five miles farther south, the Jordan empties into the Dead Sea, which has sunk to 1,300 feet below the level of the Mediterranean. This deep Jordan Valley averages only 50 miles' distance from the Mediterranean and, near Lake Tiberias, lies only 30 miles away but across mountainous terrain.

Dr. Lowdermilk proposes to take advantage of the valley's unusual topography to make the Holy Land flourish again. He suggests that water be pumped from the Mediterranean near Haifa and forced into a canal across the mountains to the Dead Sea. Such a canal, he points out, could be the key to

More water will give the Holy Land far more groves, too—and modern methods.

Desert plus water equals rich farmland—as shown by this lettuce grown under irrigation in California. Irrigation in the U. S. is reclaiming vast areas of desert.

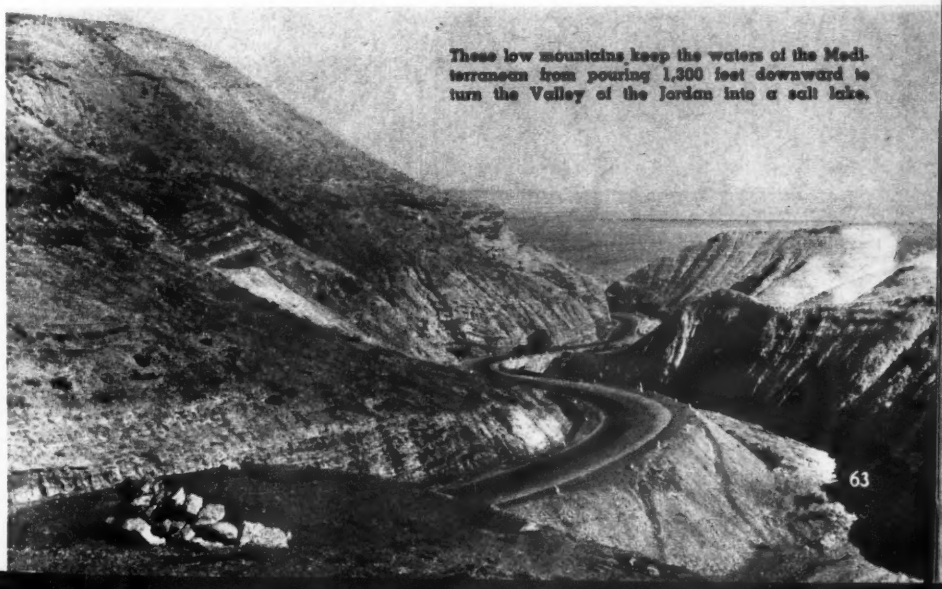
the problem of watering the arid land.

By making the waterway a succession of open canals and short tunnels, the highest point would rise only 300 feet above the Mediterranean. Naturally it takes power to lift a big volume of water 300 feet above sea level. But there is a 1,000-foot drop from the crest of these low mountains to the upper Jordan Valley. That difference in elevation could be used to generate enough electricity to power the pumping station and light some of the towns in the area.

From the power plant a navigable concrete canal could lead the overflow south on the Transjordan side of the river down to the northern edge of the Dead Sea. The canal could stay at almost the same level throughout its length so that it would still be about 600 feet above the Dead Sea and thus would have more than enough head to operate another power plant.

By tapping the Mediterranean to fill the Dead Sea, the Jordan could be dammed below Lake Tiberias, and the river's entire flow of fresh water used for irrigating the dry land. In this way more than 600,000 acres of unused land could be reclaimed.

Not only would the waterway from the Mediterranean replace the Jordan's flow into the Dead Sea but also the proposed canal could actually enlarge the surface area of the sea. Since much of the land bordering the Dead Sea is desert, the enlargement would not lessen the total of tillable land but would increase the present evaporation rate of 3,600 cubic feet per second. This additional moisture in the air, plus more water vapor from the surface of [*Continued on page* 165]

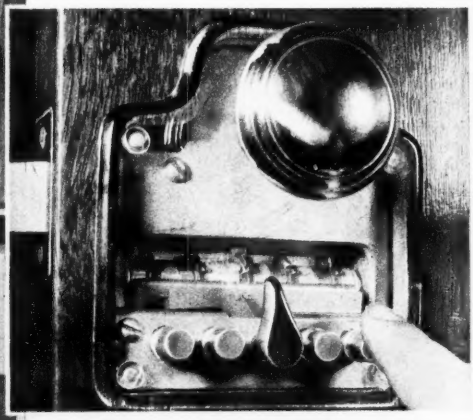


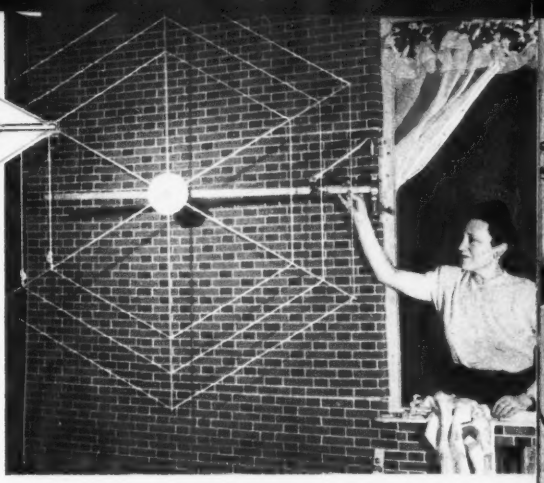
These low mountains keep the waters of the Mediterranean from pouring 1,300 feet downward to turn the Valley of the Jordan into a salt lake.

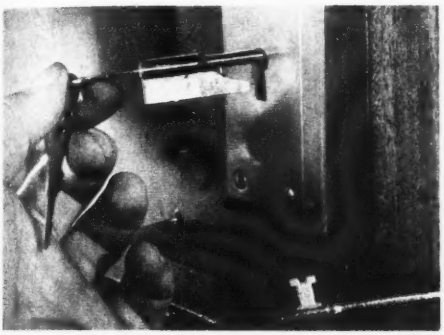
new for the home

Eight Tools in One is this portable Woodmaster—wood-turning lathe, circular saw table, powered jigsaw, grinder, polisher, buffer, sander, slotter. Using chuck on lathe head it can be used as a horizontal drill and rotary file. Weighs 25 pounds and can be stored in a closet. Above, the unit has been set up for use as a circular saw table.

Button Door Lock requires no key; it opens by pressing four buttons in correct order. Possible combinations are practically unlimited. Cutaway shows internal mechanism.



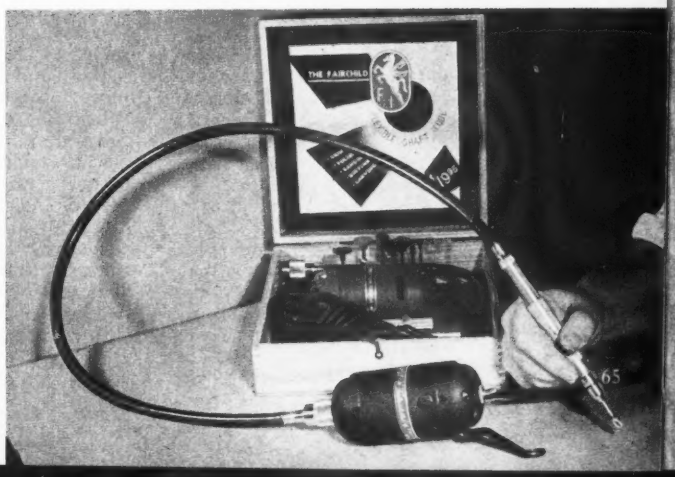




Revolving Line of new type holds 200 pounds of wash and permits removal of any desired piece without disturbing rest of wash. Line pulls over to window and can be reached easily without leaning out. Total length of line is about 38 feet. When loaded with wash the device is swung out and pushed away from the wall; when not in use it is turned vertical and pushed flat against the wall. Hand levers clamp the line to prevent winds from swinging it.

Keyhole Lock locks the keyhole, not the lock itself. It's a device that is inserted in the keyhole and locked there by its own key; it contains a miniature set of tumblers. Turning the key turns a peg which prevents removal of the device from the keyhole. A would-be intruder just can't get into the keyhole to unlock the lock.

Flexible is the word for this new flexible-shaft tool. It is operated by a 1/20th-hp 110-120 V AC-DC motor which turns at 20,000 rpm and gives 16,000 rpm at the chuck. The pencil-style handpiece is of aluminum. Shaft is three feet long and is plastic covered. Chuck capacities are $\frac{3}{32}$ and $\frac{1}{8}$ inches. It will do a thousand jobs.



MI Tests the Playboy Car

Tom McCahill reports on one of the snappiest little cars on the road.

THE Playboy, a red-hot looking little car, is the latest addition to the American automobile picture. It is being manufactured in Buffalo, N. Y. by a wide-awake crew of young engineers who feel the country is ripe for an inexpensive, truly sporty car. The Playboy will undoubtedly bring whistles of approval from the kids and sour looks from stuffy, upholstered dowagers.

At present it is being made in a three-passenger, convertible model with a steel, folding top; plans for a station wagon are on the drawing boards. When I took one out for a test run, painted fire engine red, I was mobbed at every stop by people asking, "What kind of a car is it?" and "Where can I buy one?" In appearance it's head and shoulders over its closest rivals. The sheered off planes of the one piece body give it a sleek, race car look. The car was created for the young married ex-GI, who today, wouldn't be content with the $50 jalopy Dad drove at his age.

The engine is a Continental, four cylinder, L-head, 40 hp job that gives it the snap of a rubber band. In the car I tested, there were slight signs of vibration from the engine but this was one of the first models built; the new ones are being made with rubber engine mounts which should make them as smooth as a cat's back. All things considered, including price and weight, I found this a grade-A performing automobile. In first gear, from a dead standstill, it will get up to 30 mph in exactly six seconds. In second, from a full stop, it will get up to 50 in 17 seconds and in high it did 71 mph over a measured mile. Playboy engineers claim it will reach 75 and I don't doubt that it will after it has been broken in. They maintain it will do 35 miles to a gallon which sounds reasonable. With an almost new engine I was able to get just a trifle under 30 mph.

Body and frame are welded into a one-piece job which includes a rigid, boxed rail at the extreme width for passenger protection. The body itself is made of No. 20 gauge steel. The entire underbody is given an asphalt protective covering to resist corrosion. The fuel tank holds 10 gallons which is brought to the carburetor by an AC fuel pump. The tires on the car I tested were 12x5.00. This size, however, is soon to be changed to 12x6.00.

How does Playboy handle and act at

high speeds. As long as the road is reasonably smooth, it hugs it like a leech. Naturally when bumps or ruts occur this light, short, 90-in. wheelbase job will not sit as well or give you the feeling of security you get in a larger, heavier car. They are low, good-looking and have lots of snap. They sell for $985, F. O. B. Buffalo, N. Y. By today's standards this puts them in the five and dime class. The folding hinged steel top that makes this car a "convertible" is a feature that will undoubtedly win over a lot of dyed-in-the-wool solid top fans who resented convertibles purely on the flimsiness of their canvas coverings.

These steel tops are a cinch to put up or down. When down they form part of the rear deck. When up there is a space behind the seat for a couple of children; a miniature cushion is provided for them. There is only one break in the entire top assembly and that's in the middle. This break is sealed with a rubber gasket. The chief engineer swears it will not leak.

If you are interested in buying one for a coast to coast hop or as an all around car for your family of seven, then you should have your head examined. These cars are for the man who can afford an extra car. Their very name expresses exactly what they are—Play-boys. •

SPECIFICATIONS

Engine	Continental, 40 hp. L-Head
Wheelbase	90 in.
Overall length	13 ft.
Height	54 in.
Weight	1900 lbs.
Overall width	58 in.
Front seat	51 in.
Rear axle ratio	4.1 to 1
Brakes	4-wheel hydraulic
Suspension	4 coil springs, hydraulic shock absorbance
Ground clearance	8½ in.
Shock absorbers	Direct acting hydraulic
Top Speed	70 m.p.h.
Gas consumption	30-35 m.p.g.
Tires	6.00x12
Price	$985, F.O.B. Buffalo, N. Y.

McCahill ponders difference in size between a Playboy and a Mercury. Parking in crowded streets is a cinch with former.

Counterbalanced steel top is easy to raise or lower without getting out of car. Offers good protection in the event of a roll-over.

Which Will Win— THE ELEMENTS OR MAN?

Eric Sloane, meteorologist and author, disputes MI's article of last month by Dr. Vladimir Zworykin. "You can't control the weather," says Mr. Sloane, "and here is why—

BY ERIC SLOANE

DESPITE all the "rain-making" stories in the papers of late, you still can't do anything about the weather.

We can make dew on window panes; every kid has done it by breathing on the cold surface of the glass. It's easy to make fog in a test tube or snow in a deep freezer. But how can we hope to control weather when no meteorologist has ever discovered the cause of the simplest element of weather—rain!

Occasionally there is some scientist—maybe with a press agent—to claim that weather can be controlled by man, but there is no satisfactory evidence up till now that this has been done.

Of course there is the FIDO (Fog Investigation Dispersal Operation) heat method for fog-dispersal. There are smudge-pots to protect orchards from freezing. But if you call these means of controlling the weather, then your house-

hold heating plant and a heavier coat for winter are weather control. Just outside the area of the house, notwithstanding smudge-pots, fog-burners, and winter overcoats, the weather continues in spite of everything—whether or not.

Based on the fact that cumulo-nimbus (storm) clouds have frequently formed over burned and blackened areas of African brush plains, some scientists now claim that any such blackened area will produce enough heat (absorbed from the sun) to cause rain-producing clouds. The African example has occurred, but the cloud droplets have formed around the smoke nuclei. No smoke-and-heat-formed cloud has produced a storm that would not have been caused anyway.

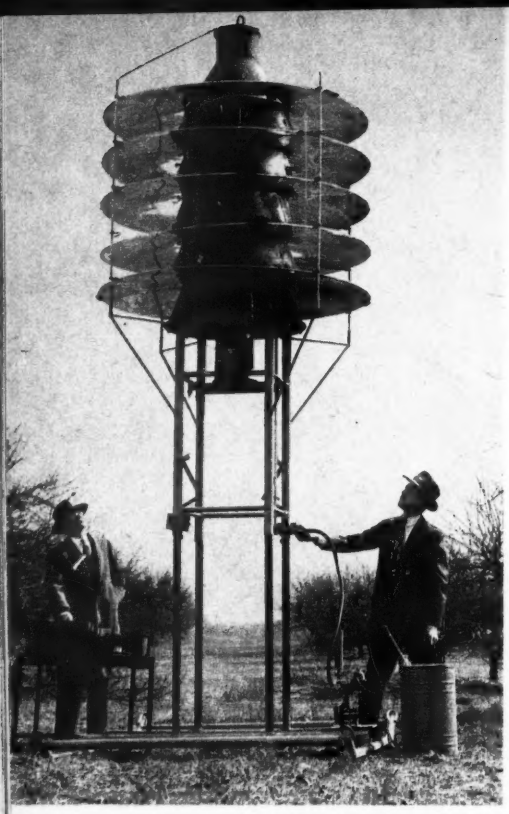
Cases of gunfire producing rain are entirely unfounded. The heat of burning Hamburg, during the war, did not produce any thunder-clouds. *Neither did the superheat of the atomic bombs.*

The heat intensity at Hamburg caused a 40-mile wind as the circulating air rushed in to take the place of the rising warm air, and a wind of hurricane force whizzed into the atomic-bomb area. But were there any rain clouds? Answer: *No!*

"In the New Mexico test," says

Mr. Sloane adjusts a cumulus cloud. He can't make weather, but he does make dynamic three-dimensional models that explain the elements.

Could this tornado, which left death and destruction in a Detroit suburb, have been dispersed by exploding an atomic bomb in its spiraling heart?



This recently-developed oil-burning infra-red heat-generator will protect orchards against temperatures of 24 degrees—but it hardly allows us to claim we've begun to control the weather.

the *Bulletin of the American Meteorological Society* (Oct., 1946), "a thunderstorm preceded the atomic explosion. . . . The fact . . . is sufficient to disprove any connection between these events. References have also been made to rainstorms associated with or resulting from the atomic bombs dropped over Japan. These have been in the main speculatory and without substantial meteorological basis."

Suppose we compare the idea of carbon-blackened "weather-control patches" with the nearest thing we already have at hand—New York City. The average flyer knows that New York from aloft shows a mass of black asphalt roofs. For heat-absorption these are unequaled, and the "thermals" rising from Manhattan Island are well known.

This "blackened area" of heat absorption has three sides of water—the Hudson and East Rivers and New York Bay—to increase the circulatory action. New York, therefore, with its dust nuclei to aid cloud formation, should be under a perpetual thunderstorm. But storms do not form over New York, and when they head toward the city, planes do not change their course in the slightest on account of heat differences.

Recently it was found that if one flew into a cloud that was prepared to make rain, then threw out dry-ice shavings, there would be a precipitation of snowflakes instead of rain. Naturally, the idea works, but the same action has been going on inside of refrigerators for years. Although the scientists have found the "trigger" to form snow, they have not found the trigger to release rain. Not really. They can hunt down a super-cooled cloud, seed it with carbon dioxide particles and cause a precipitation of fine snow, but this is snow, not rain. If the temperature below is warm enough the snow so formed will melt and fall as water—but this is not rain either. In later experiments they have peppered clouds with water particles in the hope that they might "grow" while falling through and so reach earth as rain—but this is not nature's trigger action, nor is it a likely man-made trigger action.

The accepted theory of rain being formed only in sub-freezing parts of a cloud (the Bergeron theory) was blasted during the latest war when so many flyers flew far above tropic rainstorms when even at the planes' height the temperature was well above freezing. When we learn the "trigger action" that loosens rain from clouds, we can cause the clouds over a dry area to spit rain. That day will mark the greatest step toward so-called weather control.

There have been many hurricane-control schemes. One has been to drop an atom bomb near its "eye" or center. This effect would be like dropping a stone into a water whirlpool to break up the action. It might cause more damage than the actual hurricane. But the idea has certain merits. Take note, however, that to break up the average-sized tropical cyclone (hurricane), the minimum explosion would have to cover about 100 square miles!

Let's not kid ourselves. We can't control weather—yet. We can talk about it. We can build up resistance against it by snow fences, warm clothing, home heating, blind-flying instruments, orchard smudge-pots and fog-dispersal units.

Perhaps the best solution of all is to get adjusted to it. Because you're going to have weather—whether or not. •

Hay Polo? Looks like fun, but it's all in the day's work for this motorized farm hand. The rider bunts the cylindrical bales of hay with the safety guard of his motorcycle and thus speeds up their drying. As many as 1,045 rolls have been kicked over in 38 minutes by "bike-bunting"—a neat way for a farmer to make a lot of hay.

Crash Crane, put aboard the Aircraft Carrier Franklin D. Roosevelt for tests, will lift 24,000 pounds, nearly double the load of the model used during the war. Here the crane is beached in stowed position.

Gocart Guide, simple controls make it easy for anyone to run the Super-Trac tractor. Treads replace rear wheels and help cut the weight to 750 pounds. An oscillating front axle allows smooth going over rough ground. The six-horsepower air-cooled engine has a power reverse and will run for four hours on only a gallon of gasoline.

Push-Button Pie shows what's cooking back in the kitchen. Arthur Davis lifts the "pie cover" from his invention, while his six-year-old daughter punches out her dinner order on the Menumat. Of course, all the automatic ordering is no help if the cook has run out of your favorite dish.

Flying-Wing Helicopter

Wing-tip propellers drive it through the air or rotate upward to enable it to hover and descend vertically.

BY FRANK TINSLEY

THE drone of powerful jet engines overhead draws the weather-beaten face of an old farmer upward from his hay mowing. A huge all-wing airliner soars low across the mountain valley, a tongue of flame belching from a storage compartment.

Ahead of the burning wing looms a

AIRBORNE INVASION, depicted here by the author, shows flying-wing helicopters being used to set up a base in rugged terrain. Jets' down blast helps cushion the 400-man transport's descent on "life-raft" landing gear.

towering peak of jagged rock. The old farmer braces himself for the crash and the blinding explosion that will wipe out the plane and all its occupants.

Then he sees a miracle. The mammoth silver wing comes to a full stop in mid-air, only 200 yards short of destruction.

The great propellers at its outermost tips swing in an upward arc on movable hubs. The crippled aircraft suddenly becomes a massive helicopter that hovers momentarily, then sinks slowly. Gently it floats down and comes to rest near the base of the mountain.

As the aircraft lands, deplaning ramps are let down and scores of passengers, armed with manual fire extinguishers, pour out to fight the flames. Quickly the fire fighters check the blaze. In a moment a fading puff above the huge wing is the only sign left of the near-tragedy.

Mirage or miracle? To the old farmer, yes, it's a miracle. To the man of science who has seen W. Laurence LePage's design for a 400-passenger flying wing helicopter, it's neither miracle nor mirage. The drawing-board version, which has been submitted to the Congressional committee investigating air safety, is a logical composite of flying techniques that already have proved their mettle.

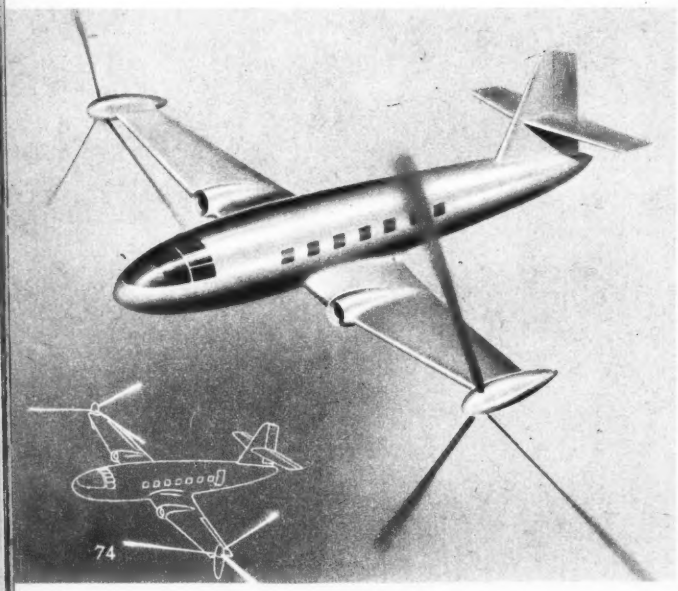
The new design combines helicopter safety with the economy and speed of fixed-wing aircraft. Each wing tip has a big six-bladed rotor-propeller on a tilting head, which can be rotated from a horizontal flight (propeller) position to a vertical landing (rotor) position. With the blades in rotor attitude, the plane would take off or land as a helicopter. Once aloft, the tilting head will swing forward and down till the blades are set in the conventional propeller position for level flight.

ON ENEMY SOIL, troops and rocket-launching personnel carriers stream down the ramps of the "rotoprop" transport and deploy for action. Cutaway reveals how the center section carried a battalion of troops with full equipment and supplies. Cargo hatches swing open under the wing, and crewmen hurry to unload ammunition, rations and fuel drums. Emptied, the transport guns its jets and shuttles off for a new load.

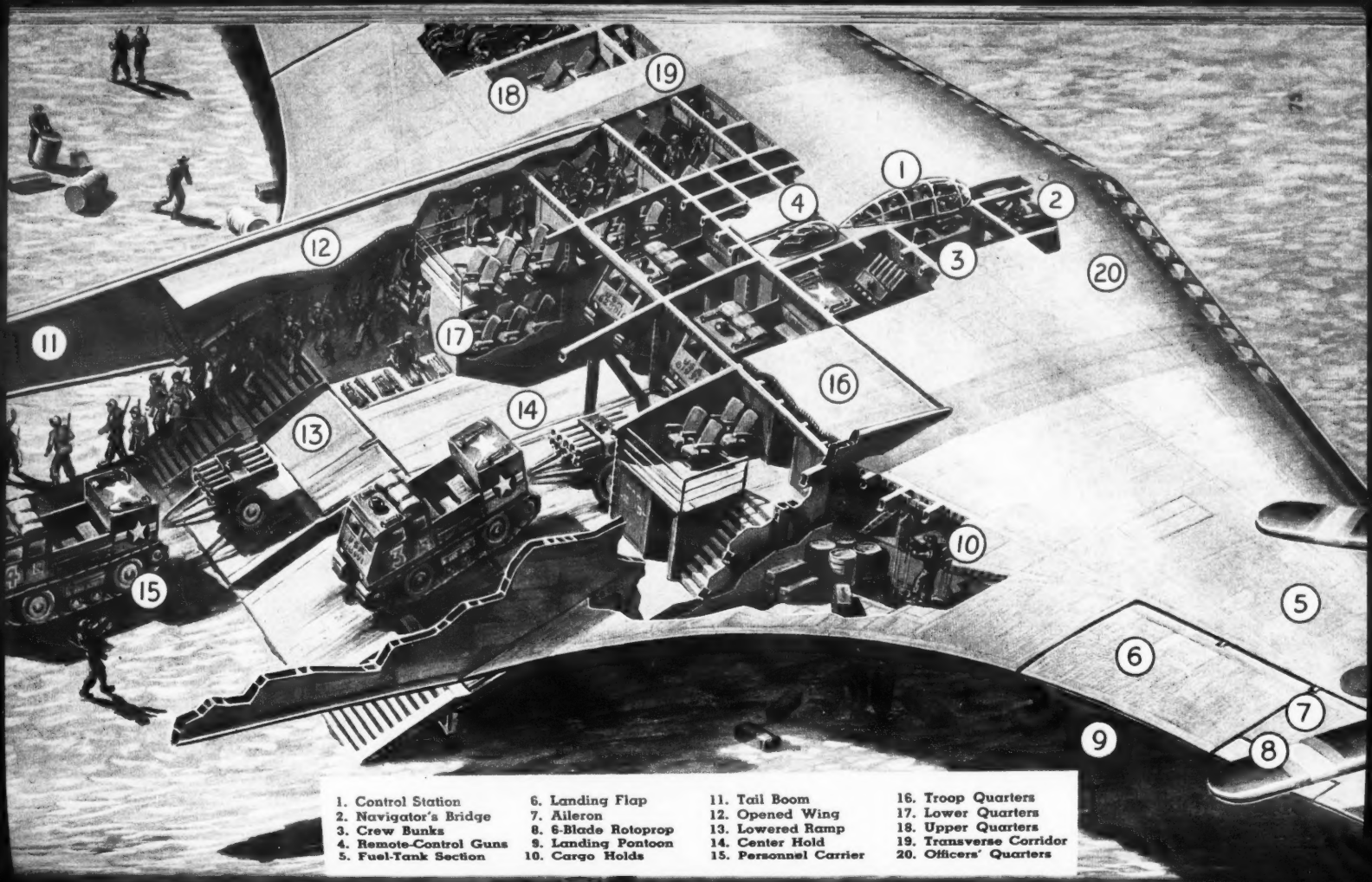
Since the jet engine, with its light weight and lack of vibration, would be the ideal powerplant for a "rotoprop" airliner, LePage's design calls for propjets set side by side in the wing tip at an angle that would allow the use of a common tail pipe. In the open "V" between their air intakes, a common reduction gear would drive the rotoprop. Should one engine fail, it would be disconnected automatically and the "prop" driven by the other engine. The other rotoprop would be throttled down and synchronized.

If the flying-wing helicopter runs out of fuel or has total engine failure, autorotation of the rotoprops alone would permit safe landing almost anywhere.

The rotoprop airliner, in addition to giving the air traveler of the future safety, speed and comfort far beyond any other form of transportation, promises a brighter outlook for airport operators as well. With takeoff and landing runs eliminated, the entire area of existing airports will be available for operations soon after production lines begin turning out LePage's winged giants, and low-cost airfields may be planned right on any large vacant lot. Such ready access to safe air transport could usher in an era that would change our civilization as profoundly as did the development of the automobile at the turn of the century. •

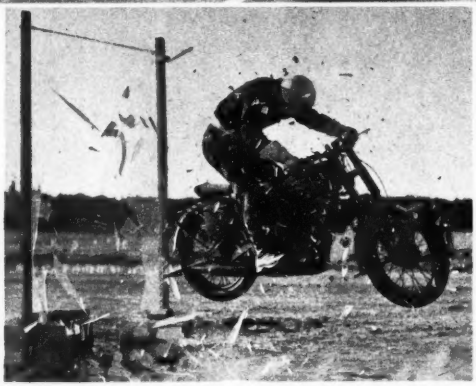


CONVERTIBLE HELICOPTER to cut hazards of air travel is proposed by Mr. LePage, who submitted this model to Congress group on air safety.


1. Control Station
2. Navigator's Bridge
3. Crew Bunks
4. Remote-Control Guns
5. Fuel-Tank Section
6. Landing Flap
7. Aileron
8. 6-Blade Rotoprop
9. Landing Pontoon
10. Cargo Holds
11. Tail Boom
12. Opened Wing
13. Lowered Ramp
14. Center Hold
15. Personnel Carrier
16. Troop Quarters
17. Lower Quarters
18. Upper Quarters
19. Transverse Corridor
20. Officers' Quarters

Old Glory, flown on holidays at the New Jersey end of the George Washington Bridge over the Hudson at New York City, is the world's largest free-flying flag. It is 60x90 feet in size, weighs 250 pounds, and requires the services of 20 men to raise it. Its pulleys, supporting cables and hoisting ropes weigh another 550 pounds. Two two-man winches raise and lower it in about 15 minutes. Long may it wave!

Plate Glass is no obstacle to Sgt. H. Wood of Ditton, Kent, England, well-known trick rider, here seen thrilling spectators at the British Army motorcycle meeting at Sarafand, Palestine. Look at that glass. Think of all those sharp edges.



Don't Run, Fellows—underneath all this she's beautiful. And all these electrically heated items are going to make her still more beautiful (say the cosmetologists).

Harvester produced in Britain takes in the potato crop from soil to sack at the rate of 3,360 pounds an hour. It's driven by a tractor and consists of two sections, a digger to lift and clean the tubers and a conveyer to deliver them. Stones and clods are rejected by the potato picker.

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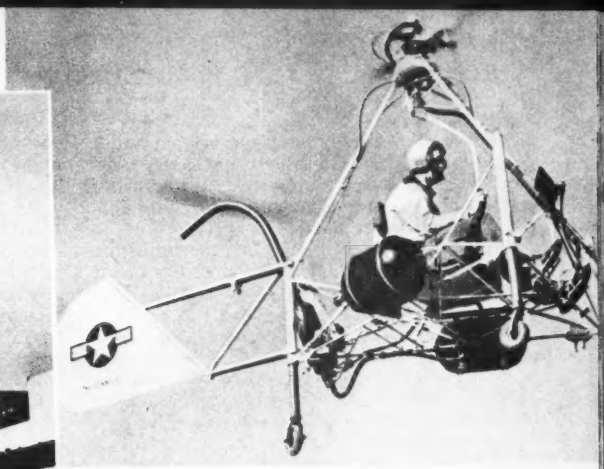
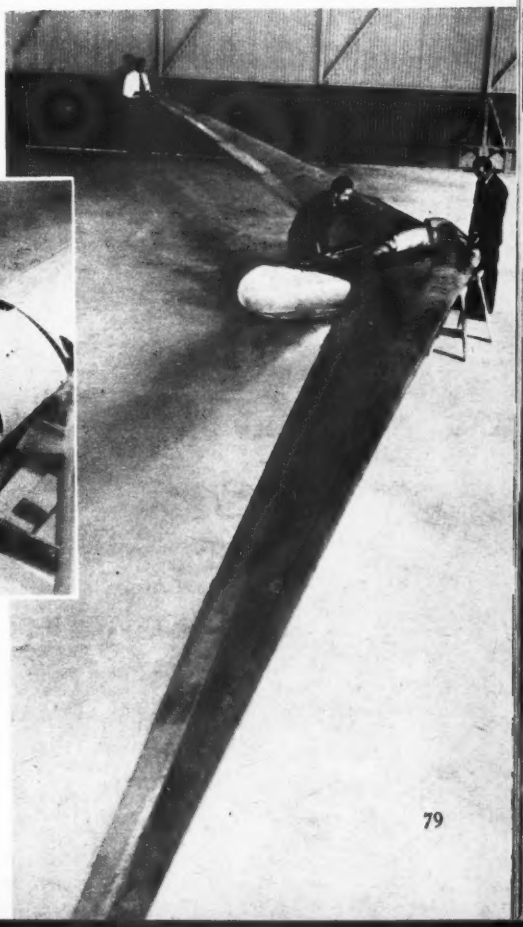
new in the sky

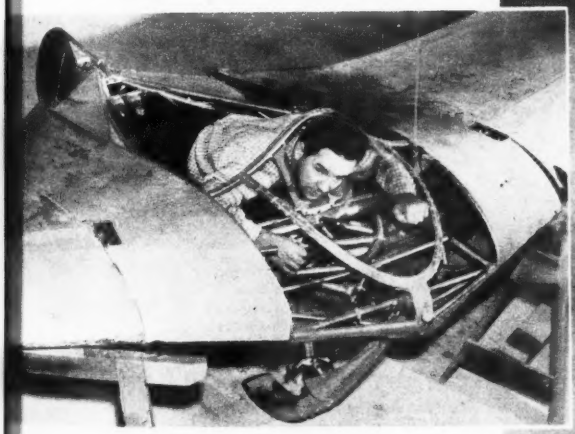
Collapsible Plane for the Army Ground Forces. Jeep can tow this package-unit Boeing XL-15 on its own wheels at 40 miles an hour; in the air it can hit 150 m.p.h.; on skis it is suited to winter aerial reconnaissance operations. Cabin has auxiliary heating system for operation at minus 65°. Reassembly for flight takes less than an hour.

Folding-Rotor helicopter has just been produced by the British for heavy pay-loads. It is a four-seater known as Type 171. It is intended for use as an air taxi, feeder-line bus, rescue work, or artillery spotting. Designed for life of 10,000 active hours.



Heli-Motorcycle is the first of its kind in the world. Powered by two ram-jet units weighing 10 pounds each, it can lift 300 pounds besides its own weight of 310 pounds. It's a U. S. Air Force product.





Pilot Lies Down in the 78-foot Nazi glider brought to the U. S. for study. Closeup picture reveals comfortless position of operator. Controls are wheel and tiny toe-rudder pedals. Emergency bail-out is possible despite cramped quarters.

How to Survive a Crash

[*Continued from page* 55]

passengers in private planes have acted under the false conviction that the use of safety belts would cause internal injury when crashes occur. They have ignored these reliable safety devices," he asserts.

"Results of research show without question that serious abdominal injuries rarely occur when belts are used and people are held in their seats."

Of 100 crash survivors whose safety belts were broken by the force of the impact, only three showed sufficiently severe internal abdominal injury to have mention made of it in the doctors' reports, Mr. De Haven says.

But the safety belt can be improved. It should be made stronger and given unbreakable anchorage and should be replaced at the first sign of wear.

How should a pilot "take" a crash? The Cornell Research has an answer for that, also.

When a crash appears certain, the flier should place his arms against the instrument panel or the seat in front and rest his head against his arms. This does away with the forward swing of the head when the body is checked by the safety belt.

The arms also serve as a good cushion, as Mr. De Haven can testify from his own experience. In World War I when his military plane crashed, he saved his own life by folding his arms to shield his head and leaning forward to brace himself against the cockpit.

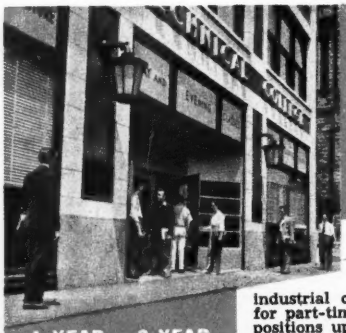
All the lessons learned by this research are fully as important for automobile riders as for aviators. The same laws of physics and of physiology apply. Automobile makers have recognized some of the hazards and have begun smoothing out instrument panels, softening up projections and making steering wheels less deadly.

Car passengers ought to have safety belts, too, Mr. De Haven holds. Even without a belt, however, automobilists can avert serious injury in many crashes by resting their heads forward on their arms and bracing against the shock.

The idea of turning all seats in passenger planes to face backward is being seriously considered. This would enable the seat back to distribute the force of the crash over a large part of the body, and, as we have seen, thereby to lessen the probability of injury.

Experimental installations of this sort have been tried in England, where King George VI now has a backward-facing seat in his special

[*Continued on page* 166]



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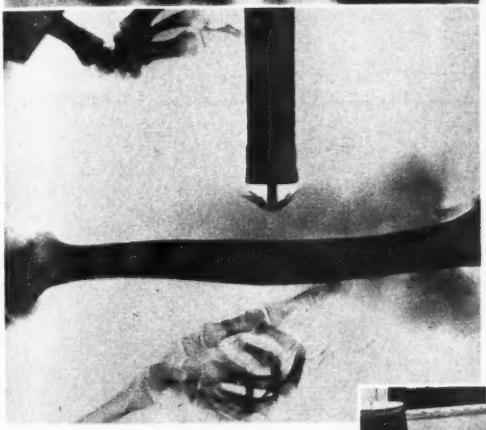
Aching Feet get quick relief in a new machine that exercises the tendons and muscles of the metatarsal arch. It is claimed that the beneficial action goes deeper than hand massage and that regular use aids fallen arches and mistreated feet. The device consists of a substantial metal base with an adjustable foot rest. Just kick off those tight shoes and strap your foot in place. Then work the handle to roll a rubber ball gently back and forth under the arch. Now, feel better?



Shooting Pain? You won't feel a thing when the doctor "shoots" you in the arm with the new medical airgun. This "hypospray" jets the drug into the body without breaking the skin. Held above the hypospray in the upper picture is a hypodermic syringe. The hypospray is bigger and, to the "needled" patient, a lot better. The X-ray photo shows the airgun firing its load into the patient's arm through the sterile "metapule," which is pierced by an invisible hole whose diameter is no larger than that of a human hair.

Bed Warming is as easy as turning off the light when you're using this new electric sheet. It's slipped between the regular top sheet and the blanket or comforter. Regardless of the changing temperatures in the room, automatic heat control will keep you snug all night at whatever warmth you select before going to bed. Flick the switch, then sleep tight through the most blustering blizzard winter can offer.

Industry's Windpipes

[*Continued from page* 58]

there are complications. For this, too, he has worked out a playfully simple solution.

From his experience he may decide that somewhere in what may be thousands of feet of duct there is an infinitesimal crack, so thin a hair couldn't squeeze through, but nevertheless big enough to cause trouble and drain power. To find such minute leaks through which cold air enters a system, he places a piece of tissue paper in the channel. The air carries the paper along and in a few seconds it is sucked up against the crack.

There are more orthodox and much more complicated ways to do that job. But they cost more, take more time and don't do the job any more efficiently than Cassie's cut-rate short-cut.

He has just as unorthodox and inexpensive a trick for locating troublesome leaks in ducts carrying warmed gasses. He introduces titanium-tetrachloride—skywriter's smoke—into the duct and watches from the outside to see where the telltale stream escapes.

The layman's reaction to all this is, "That's simple and obvious. It doesn't take genius. Why didn't somebody think of those things long ago?" That's exactly what engineers also say with a wry expression. But then the engineers add that like many other devices and systems it isn't obvious until it is thought of by people who have the spark that sets the Jack Cassies apart from the rest of us.

Eighteen years ago Jack Cassie, fresh out of Stevens Tech, went to work for the Sturtevant Division of Westinghouse Electric Corp. He was set to the usual variety of chores assigned a young mechanical engineer. But as he moved from job to job he began to be increasingly impressed by the power plant. American industry, and America itself, he concluded, would be as great as its power plants were efficient.

The power plant of a factory is its heart, and the efficiency of the power plant depends to a great extent on a large supply of steam to drive the electricity-producing turbine generators. The steam is made in a boiler, just about as it is in your home heating system. But while you can get sufficient air for the boiler in your home heating system by opening a damper, an industrial power plant needs thousands and even millions of cubic feet of air every hour, and it must be drawn in through thousands of feet of metal ducts.

The vitally-needed air is carried up and

[*Continued on page* 89]

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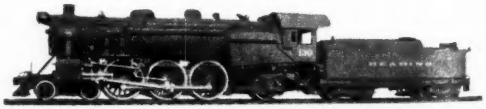
Here it is! Mantua's new PACIFIC locomotive. Exact scale model of the famous locos that pull passenger trains all over the country. The Pacific was previewed at the New York Hobby Show in November—*it was the hit of the show!* Kit complete, with tender—$49.50.



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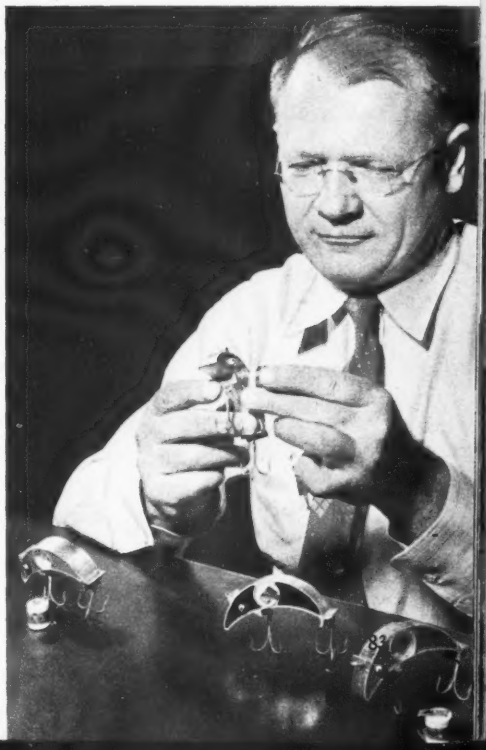
Bottle Holder keeps bottle from getting lost—and so keeps baby from getting mad—and so keeps pop and mom's eardrums intact. Very convenient, says baby himself.

House-Moving Day finds this house sitting on a 30-ton tractor-trailer and rolling down the road to its new home site. To allow passage, trees were trimmed, wires torn down and bridge railings removed.

Big Piece of carpet padding is easily made from little pieces by painting a liquid, self-curing compound called Rug-Sealz on their square-cut edges and pushing them together. Bond is tougher than the padding.



Fishing Lure of a Westinghouse engineer uses a capsule containing sodium bicarbonate. When lure is dragged through the water there is produced a stream of bubbles that give off little "pops" which attract fish's attention.

Undersea Base To Protect Subs From Atom Bombs

Rocket-carrying submarines would be Navy's best offensive weapon in atomic war, fighting from hidden supply depots in the ocean depths.

BY GILBERT PAUST

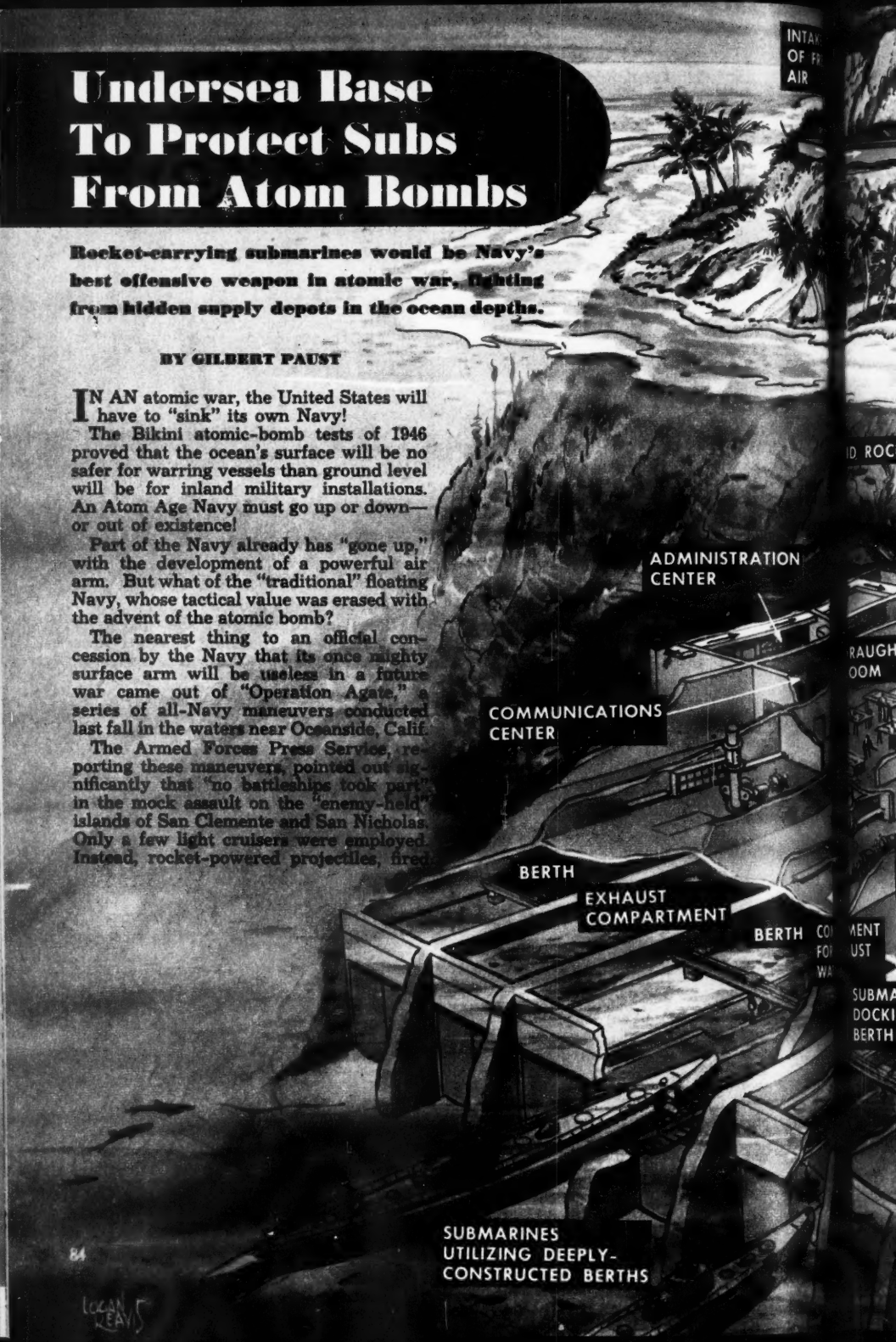
IN AN atomic war, the United States will have to "sink" its own Navy!

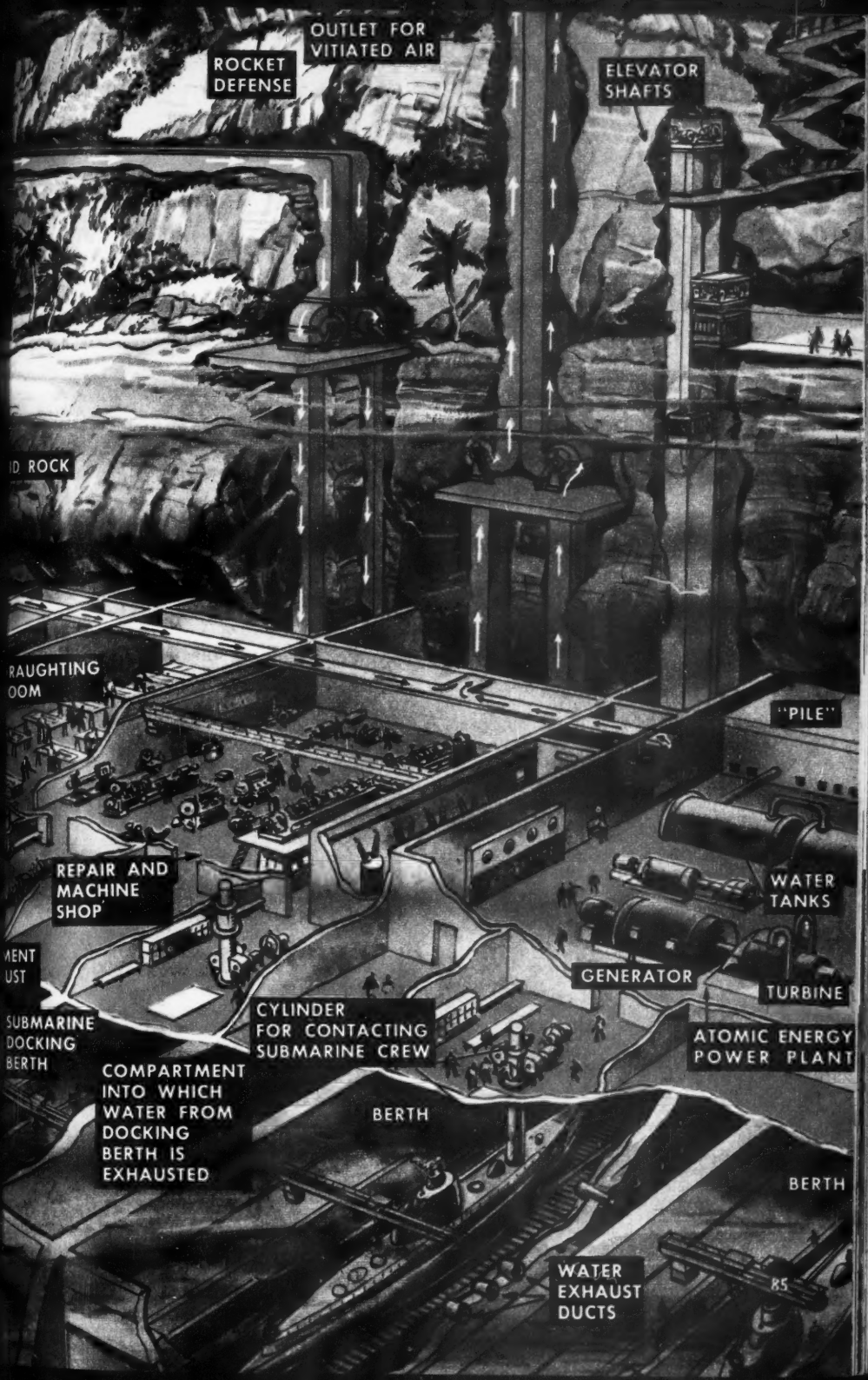
The Bikini atomic-bomb tests of 1946 proved that the ocean's surface will be no safer for warring vessels than ground level will be for inland military installations. An Atom Age Navy must go up or down—or out of existence!

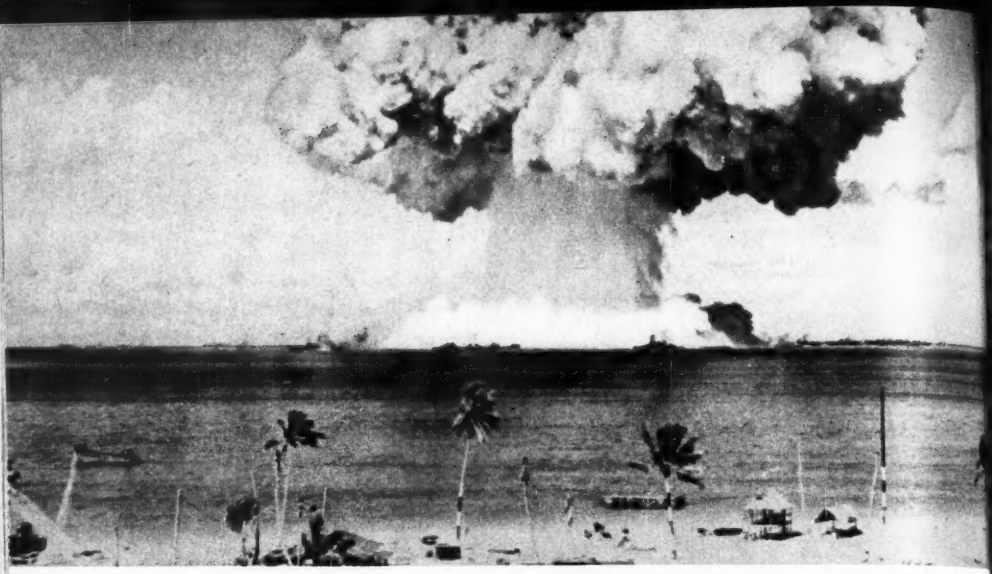
Part of the Navy already has "gone up," with the development of a powerful air arm. But what of the "traditional" floating Navy, whose tactical value was erased with the advent of the atomic bomb?

The nearest thing to an official concession by the Navy that its once mighty surface arm will be useless in a future war came out of "Operation Agate," a series of all-Navy maneuvers conducted last fall in the waters near Oceanside, Calif.

The Armed Forces Press Service, reporting these maneuvers, pointed out significantly that "no battleships took part" in the mock assault on the "enemy-held" islands of San Clemente and San Nicholas. Only a few light cruisers were employed. Instead, rocket-powered projectiles, fired




OUTLET FOR VITIATED AIR
ROCKET DEFENSE
ELEVATOR SHAFTS
ID ROCK
RAUGHTING OOM
"PILE"
REPAIR AND MACHINE SHOP
WATER TANKS
GENERATOR
TURBINE
MENT UST
SUBMARINE DOCKING BERTH
CYLINDER FOR CONTACTING SUBMARINE CREW
ATOMIC ENERGY POWER PLANT
COMPARTMENT INTO WHICH WATER FROM DOCKING BERTH IS EXHAUSTED
BERTH
BERTH
WATER EXHAUST DUCTS



Atomic attack on an undersea base such as the author proposes for our Navy's subs might look like this underwater blast at Bikini—if the enemy did spot the target.

from Navy Skyraiders, rained on the little islands while swarms of submarines closed in to attack.

"The important part played by submarines in the exercises," the news service reports, "demonstrated the Navy's policy of making undersea craft a more powerful threat to enemy installations inland, as well as near coasts, by the use of equipment for launching guided missiles of supersonic speed, capable of carrying atomic bombs."

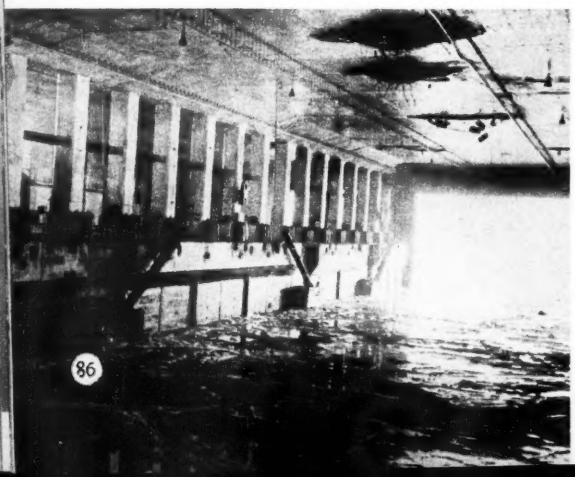
Thus, the "sinking" of its own Navy by the United States as a prelude to a third world war would involve not the mere scuttling of obsolete surface craft, but submerging its might to an undersea level, for a new kind of hide-and-seek, radar-proof warfare.

The submarine fleet of the future was born in the minds of Navy men at Bikini. As yet unborn, however, are the vast undersea bases from which such a fleet will have to operate to escape the Bikini-proved fatal consequences of surface operations exposed to A-bombing.

In an atomic war, concealment is the only way an A-1 priority military target can avoid destruction. Submarine bases below sea level will have an excellent chance of being unknown and remaining secret from the enemy.

The ability of an enemy to detect such bases will require devices and techniques that even World War II, which produced radar and the atomic bomb, failed to develop. Radar efficiency is minimized under water, and hydrophones, which can detect submarine sounds, will be equally impotent, since such bases will be insulated against them. An instrument to detect the heat, which the electric lights and galleys, welding torches and other power tools within the undersea base will produce and radiate, does not exist. Protection against visual detection, of course, will be a minor problem even with the camouflage techniques already known.

The biggest headache for the



Sub pen at Helgoland shielded Nazi U-boats from Royal Air Force bombs, but atom bomb could have destroyed it.

submarine engineer building the first undersea base for the Navy's tin-fish fleet of the future will be water pressure. Such bases cannot be planned for the floor of the ocean, or even in all the places which military experts will designate as strategic. Water pressure increases by one atmosphere—or about 14 pounds per square inch—for every 30 feet of depth.

Another limit will be imposed, not by what the structure can stand, but by what the submarines will be able to take. It would be senseless to design a structure for a depth of 2,000 feet, for example, if the submarines which are to use it can stand only the pressure of 1,000 feet.

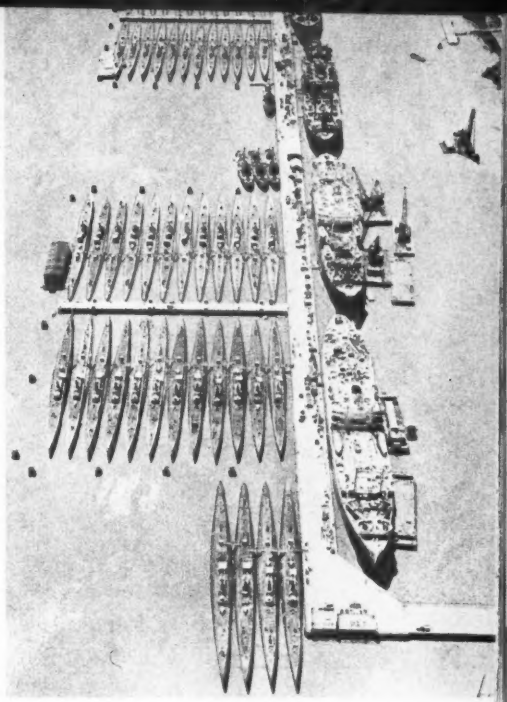
The submarine bases of the future probably will be built under a few hundred feet of water. It would take a very strong structure to support even the weight of 300 feet—and the ideal location will be in an ocean current, in case somebody does invent an ultra-sensitive heat-detecting device that will work under water as well as in the air.

Ventilating a large undersea base, where major repairs could be made and from which a score or more of super-submarines could be supplied with food, ammunition and general maintenance, is difficult but not impractical.

A system of horizontal and vertical shafts, driven from the base through ground rock and up to carefully camouflaged surface hatches, will be supplemented by liquefied oxygen and chemicals capable of absorbing the carbon dioxide and moisture from the air within the base. Even soilless gardens may supply the base with fresh vegetables and, at the same time, assist in absorption, since plants use both the moisture and carbon dioxide.

The berths for the submarines probably will be caves on the underside of the base, filled to the top with water rather than partly filled with air, which would cause huge bubbles to rise to the surface when a submarine entered. A water-filled steel cylinder, descending from a room above the pen, will secure itself to a hatch atop the entering submarine so that only water in the cylinder will have to be pumped out to provide a dry shaft between the submarine and the base.

The utilization of such bases for submarine V-2 missile ships, troop carriers, scouts and other tactical variants, is still in the future. Yet, the Navy's present-day realization, based on Bikini and other tests, that recognition of a target means its annihilation sets the stage for their development as one of America's hopes for survival in an atomic war. •



Bomb's-eye view of these subs clustered at Mare Island, Calif., shows how an atom blast could wipe out a typical "sitting duck" naval base.

What a surface atom-bomb explosion can do to a sub is indicated by this closeup of the battered U. S. S. Skate after the Bikini tryout.

It's a Snow Plow...

It's a Leaf Remover...

It's a Lawn Mower

NO, IT'S not Superman but a super-duper device for keeping your yard close-trimmed and tidy, whether it's winter, fall, or summer. In Picture 1, Bernard L. Larson of Buffalo shows how he rigs his gasoline-powered gadget to do all the snow-shoveling around the place. Those little paddles pitch into the snow like the big rotary plow the railroads use to clear the tracks after a blizzard. The blower sucks up the snow, shoots it up the spout.

When warmer weather turns your lawn green again, you can convert your snow plow into a lawn mower (Picture 2) by removing the blower and replacing the paddles with a pair of rotating discs. Lawn littered with leaves in the fall? Here, in Picture 3, Mr. Larson has the solution in the bag—the burlap one he has attached to the spout to catch the leaves flipped into the blower by spinning brushes. •

Industry's Windpipes

[*Continued from page* 82]

down and around corners, and is pre-heated, conditioned and cleaned as it travels to and from the boiler through the ducts. Cassie explains, "Air is like a child. If you want it to behave and do your bidding, it must be taken by the hand and led gently, especially around corners."

If it isn't led gently, if the corners are too sharp, for instance, it will "skid," it may lose its "footing" and bunch up in one part of the passageway—making other parts of the duct comparatively empty, setting up internal resistance, and thereby curtailing the supply of air and lowering the plant's efficiency.

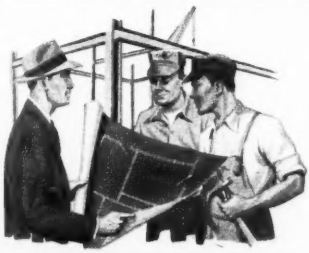
Summed up and simplified by Cassie, the more air in the combustion chamber of a boiler, the more steam you get—and the more electricity. The more efficiently industry can obtain electricity, of course, the more efficiently it can turn out anything from undershirts to steel girders.

Cassie has spent a good part of his adult life observing, studying and testing air flow the way a child psychologist studies children. Some times his experiments have the appearance of playfulness you'd expect in studying children. To determine if the air is flowing smoothly, for instance, he holds a piece of string in the passageway. If the string blows out evenly, he knows that the flow is okay at that point. But if the string whips about, or swirls like the core of a tornado, he knows that he has found a trouble spot.

There is one tool in his bag of tricks which is conventional: a bent pipe, known as a Pitot tube, which he uses in the same way it is used on airplanes, to measure air speed. But as Cassie says, it is so simple you can't simplify it anymore.

Cassie has played his harmonica to diagnose the ills of air induction systems at the tops of some of the world's tallest buildings and at the bottoms of some of the world's deepest coal mines. He has played his tunes in places like the Holland tunnel. Wherever he goes, engineers will tell you that Jack Cassie has a nickel solution for million-dollar problems.

Recently when his son went off to college Cassie gave him one major piece of advice, "If you can do it better, easier, cheaper, don't worry about whether it's in the books. Prove it, and you can put it in the books." And then with a grin he repeated a definition given to him by a favorite professor at Stevens years ago, "An engineer is a guy who can do for a buck what any damn fool can do for two." •



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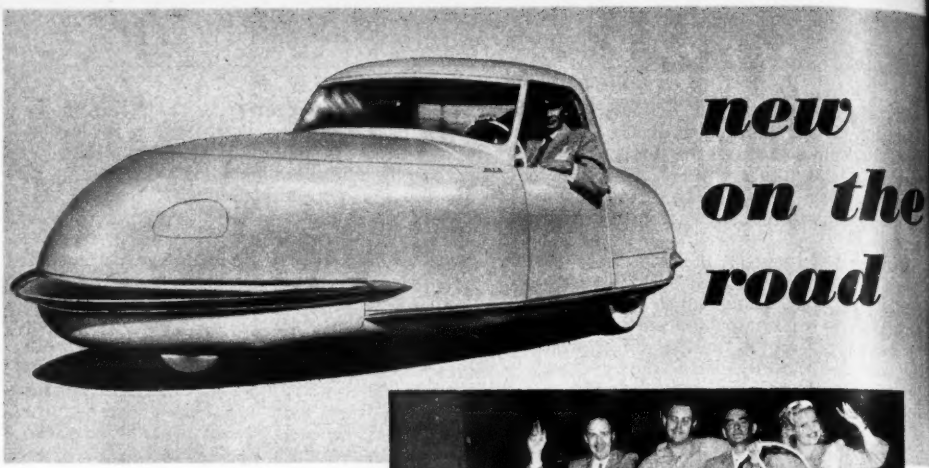
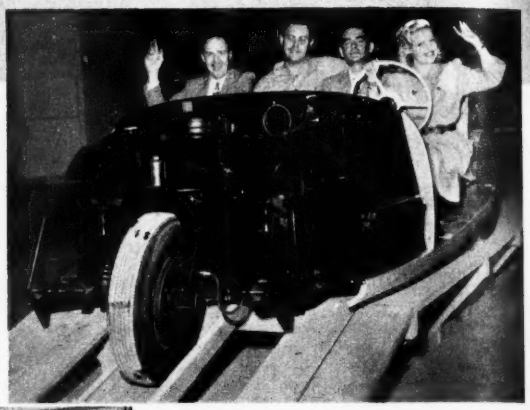
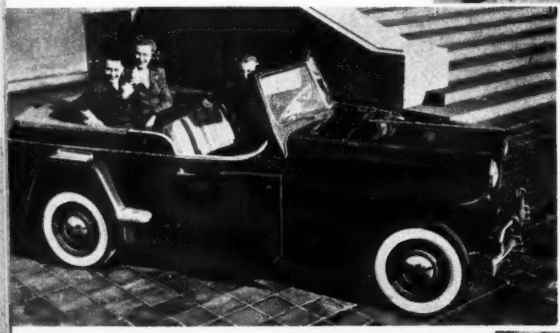


new on the road



3-Wheeling Car has a smooth new look, above, with its snappy body; at right chassis is exposed showing roominess and unusual construction. Speed, 116 mph; gas 35 to 50 miles per gallon; price, $995 at the factory at Van Nuys, Calif. The wide front seat can hold four persons. Body is aluminum, and solid top can be removed in one minute.



Jeep Deluxe is smart looking and is a far cry from its army ancestor. It's still just a jeep with its face lifted. It is called the Jeep Sports Phaeton, and lives up to its name with a new paint job of fire-engine red with cream trim, angled windshield, and smartened-up appearance. In production this spring.

Rear Engine V-8 is the power plant of this Tatra car made in Czechoslovakia and now on sale in the U. S. for $6,550. Engine is 75 hp and is aircooled; note airscoops behind rear windows. Streamlining, including dorsal fin, makes possible a 100-mph speed, manufacturers say. King Farouk of Egypt likes the sky-view model; he's getting one.

Car-top Home is used by Don Cast and wife when they go motor-touring. Anchored by suction contacts on top of the car is a 6½x4-foot boudoir and a canvas cover that provides a roof with screened side windows. Unit weighs 150 pounds.

New Fiat is bigger than previous model exported from Italy. This 1,100 cubic-centimeter model has only two designs, above and left, in convertible style. Sedans are in the making. With a four-cylinder overhead valve engine, and inverted carburetor, this smart buggy is said to do over 100.

Back Porch fits on trailer. After a long, tiring pull, the happy tourist simply unfolds the extension that has been out of sight all day, and there he has a screened-in back porch. With electrical connections plugged through, he can relax for a bug-free evening in the open air During the day the porch is equally useful for sun-bathing.

Unusual Gadgets Test Products You Buy

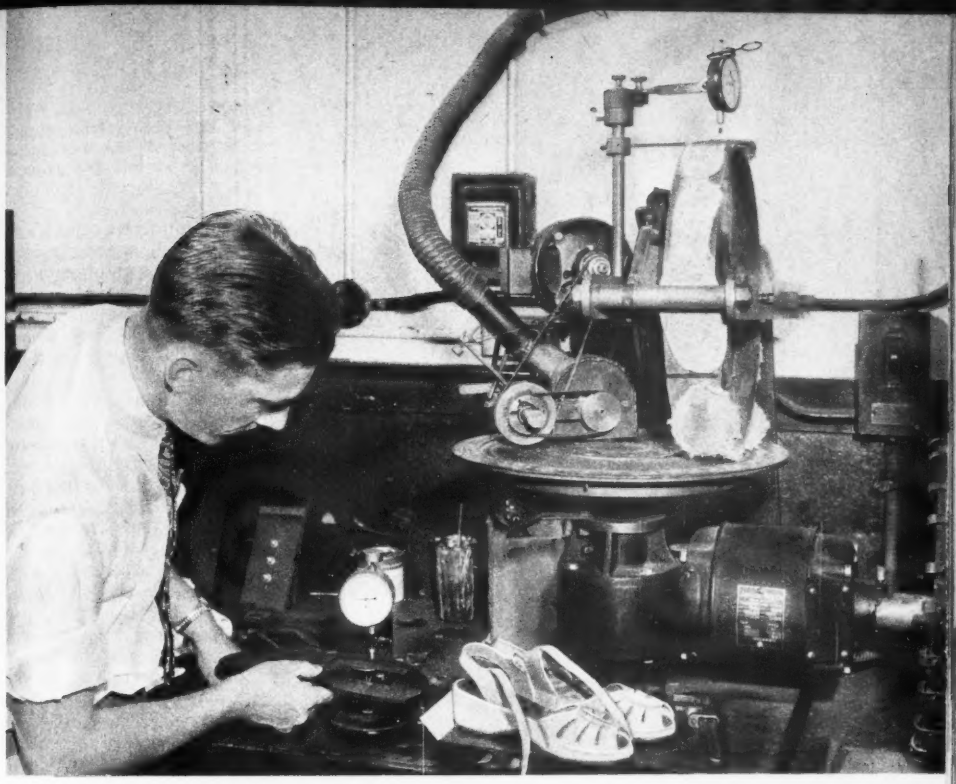
BY LOUIS HOCHMAN

IF YOU'RE worried about your youngster's destructive tendencies, have courage! He may grow up to work for the United States Testing Company, where nothing pleases the boss more than an employee with a good, healthy, destructive instinct.

This fantastic concern, housed in a block-long, five-storey building in Hoboken, New Jersey, makes a fine art of meticulously destroying the hard work of manufacturers, and what's more, making them pay for it!

In this "House of Destruction," queer gadgets of every description put the products of American Industry through gruelling paces, and come up with facts and figures that tell an accurate story of the product's normal life expectancy. Without ever being worn, girdles stretch and twist until they burst at the seams, clothes placed in artificially produced tropical climates deteriorate from various species of carefully nurtured bacteria and fungi, nylon stockings develop runs and poke through at the heels and toes, and shoes take thousands of steps until their soles wear through. A chair groans and eventually collapses under the abuse of a 40-pound sack plunking down on it hour after hour. Mattresses withstand as long as they can the mechanically-simulated effects of a 270-pound insomniac tossing and twisting on them.

The sense behind this apparent nonsense lies in the fact that manufacturers want to know exactly how much wear and tear their products will stand in the hands of the average consumer, or at the mercy of any other destructive elements they may be exposed to. Joe Doakes, Inc., wants to know if a moth-proofing compound they developed will protect a suit against the ravages of the ravenous creatures, so UST sprays the garment and calmly feeds it to a few of their pet moth larvae, which they incubate on the premises. The findings show that although the



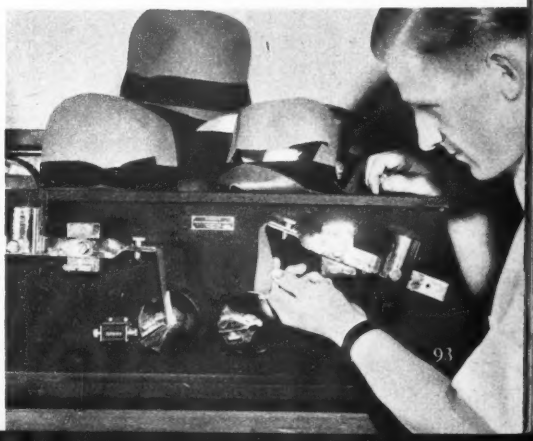
SHOE SOLE TESTER measures sole toughness. The soles are mounted on a wheel which revolves, wears them against a rough surface.

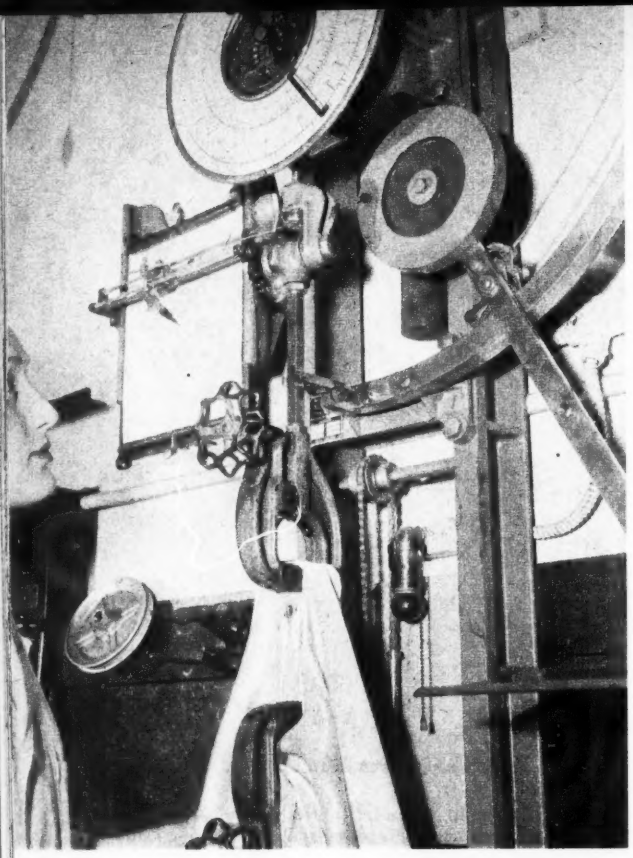
suit is no longer palatable, the grubs did find an untreated portion under the coat lapel and dined luxuriously on that area. Moral: Spray clothes inside and outside.

Will a new brand of cosmetics, lipstick, or deodorant prove toxic to the skin you love to touch? UST finds out by injecting extracts of the products into the shaven flanks of rabbits or white mice. How many fish can you reel in on that new line you bought? UST answered that question by rigging up a contraption which continuously reeled the line, weighted at one end to represent the fish, back and forth through a small metal hole until the friction snapped its strands. Did you ever accidentally send your watch to the cleaners with your dirty laundry? Well, UST did, but not accidentally. They tested a manufacturer's watch by wrapping it in dirty linen and running it through a washing machine. When it survived this treatment, a UST engineer took the ticker for a swim in the surf, and then relaxed on the beach with his watch-bearing wrist buried in the sand. The watch is still ticking.

Not all manufacturers, however, are blessed with such favorable reports on their merchandise. Too often they have to grin and bear it when they see how quickly UST gremlins can make mincemeat of their pet projects. One mechanical contraption, designed and built by the UST boys, will quickly tell whether or not a slide fastener

HAT TESTER. Will a sharp bend in the crown of your hat cause a hole? This machine bends hat felt material back and forth under tension until it breaks.





FABRIC TESTER. The technician is breaking a sample fabric to find out whether or not it is strong enough for its intended purpose.

will live up to its reputation. At lightning speed, it continuously zips and unzips the zipper until it breaks down. If it's anywhere near normal, it should last about 10,000 zips. Some last as many as 35,000.

The mattress annihilator is a 270-pound octagonal roller which, at the rate of 30 times a minute, moves back and forth over the mattress some 200 to 400 thousand times, each time giving an extra bit of push to the edge of the mattress where people generally sit down. One day of this is enough to age a mattress several years.

The gadgeteers of UST are all mechanical engineers with a complete machine shop at their disposal. Give them a product and in no time at all they'll whip together an infernal machine which will manhandle the product in exactly the same

ARTIFICIAL SUNLIGHT MACHINE quickly tells how much fabrics and dyed materials will fade.

HOSE GAUGE is a special form which checks nylons for stretch, width, foot size and wearing length.

manner as the average consumer would, only more so. Several of these gadgets are even manufactured on a commercial scale and sold to manufacturers and other laboratories who wish to do their own testing.

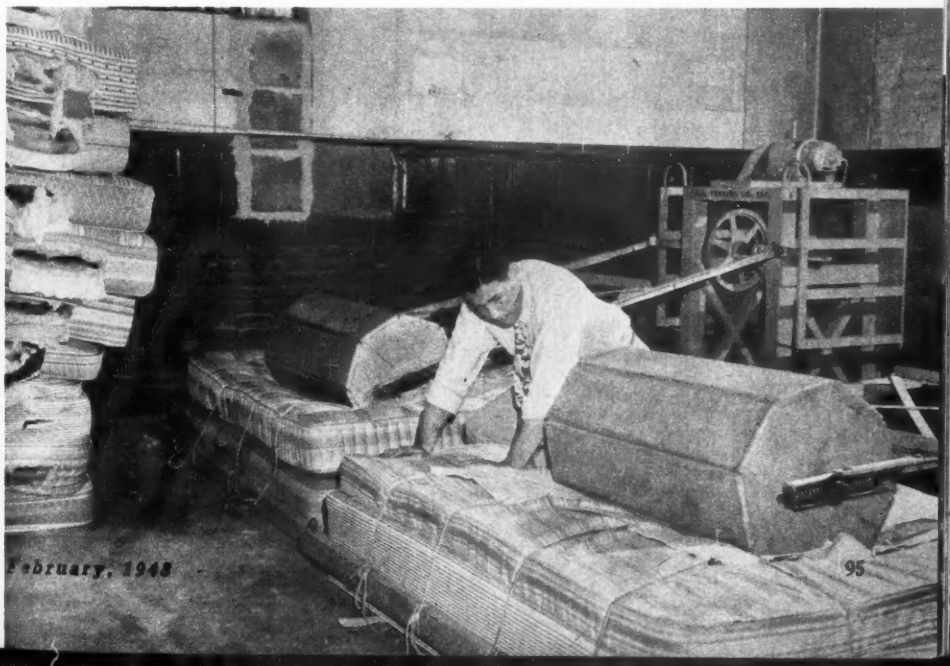
If a manufacturer wants to know what the elements will do to his product, UST can reproduce any climate or weather condition from the Equator to the North Pole. Their "weatherometer" will subject a product to anything from high humidity, desert sun and extreme cold waves to driving rain. To find out what a product will smell like in six months or a year, UST technicians use their "odometer" and pre-aging machines. In their tropical room, where the temperature is kept at 90 degrees and the humidity at 90 per cent, are boxes of soil impregnated with a variety of over 40 species of tropical mold, bacteria, and fungi. Any product that can live through a burial in this concentration of destruction *has* to be good.

During the war, UST tested many military articles such as tents, ropes, shoe leather and uniforms slated for the South Pacific and therefore presumably treated for tropical climates. Some of these articles, after being buried for a few weeks, crumbled to dust. Other articles couldn't even be found!

Up in the livestock department, UST pampers a variety of wild life such as rabbits, white mice, hamsters, guinea pigs, flies, mosquitos, ticks, termites, moths and roaches, used in their testing and destroying. Hungry [*Continued on page* 166]

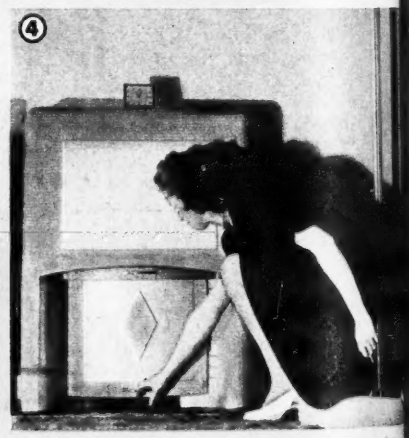
STOCKING FLEXER stretches nylons until a run occurs. Good stockings can be flexed thousands of times without noticeably changing their shape.

MATTRESS ROLLERS test the life of mattresses by heavily rolling back and forth over them hundreds of thousands of times, until they are worn out.



Convertible Fireplace

SLIDING panels transform this British-made fireplace from open hearth to electric radiator, hotwater heater or furnace. In Picture 1 mother uses electric-radiator panel to warm up room. Then (2) she lights the open fire behind the panel. In the third photo she pulls down the screen so her little girl can play alone in safety. In Picture 4 mother draws down the outer panel after banking fire for the night with ash and slack.



Photos by Pickow, Three Lions

Tie Your Own Flies

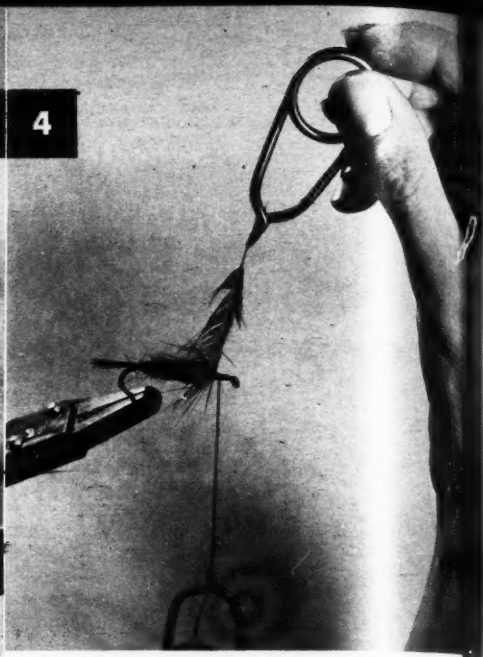
Everybody's doing it! It's much more fun to catch that fish with a fly tied by yourself.

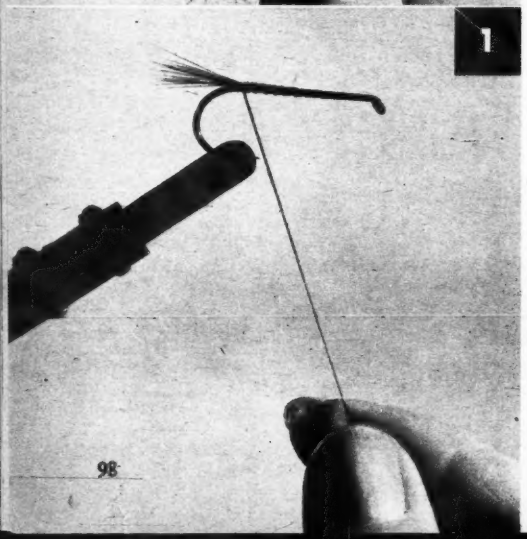
BY GOLD V. SANDERS

A HUSKY he-man from Oklahoma sat hunched over a bench in a New York tackle shop laboriously trying to tie pieces of feather and hair on a tiny fishhook. His thick fingers fumbled over the intricate work. He had to wrap and unwrap and try again and again, but he kept doggedly at it as if he were doing the most important thing in the world.

With the expert help of his teacher, Elizabeth Greig, the big man finally got a reasonable facsimile of a Royal Coachman put together and his eyes gleamed as he surveyed his first fly.

This learner happened to be a wealthy oil man. On a visit to New York he spent an hour a day at the Angler's Roost, in the Chrysler building, which is a sort of headquarters and meeting place for flytiers and fly fishers from everywhere. Mrs. Greig, a





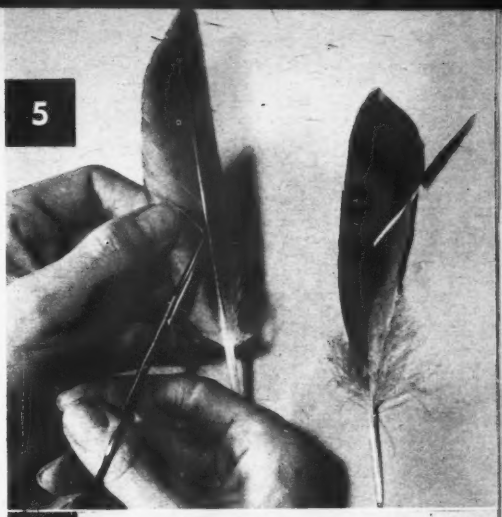
real professional who started her four-year apprenticeship in Scotland when she was 14, presides over the flytying fraternity. She can whip together any one of a thousand standard bass, trout or salmon flies in just a few minutes.

The recent upsurge in the art of flytying has taken hold of new thousands all over the country. Several colleges have established flytying courses. It may be an outgrowth of new interest in the art engendered by the courses given to hospitalized veterans as a part of occupational therapy. At any rate there is now more demand for cock feathers and other standard trout fly ingredients than can be filled by the feather dealers.

Now there is no denying that there is more satisfaction in making a trout rise to your own hand-made lure than to one you bought in a store. A good many have been aware of this in times past. When you take a fish on your own creation there is a double satisfaction. Your skill in tying and your skill in presenting the fly have combined to bring you a very personal kind of triumph. But aside from the actual catching of fish, there is the undeniable creative urge involved in the pleasure one gains from turning out a thing of beauty.

And trout flies are beautiful—at least they are when tied skillfully. They are imitations of nature, of actually existing insects that fish feed upon. They are, or should be, exact reproductions in shape, size and coloration. To achieve this, the

Steps in the making of a Black Gnat: 1, with hook gripped by flytier's vise, a few turns are made on shank and tail feathers tied on; 2, wool fibers are twisted around a wrapping thread; 3, wrapped thread is twisted forward on shank, making a smooth body; 4, using two pairs of hackle pliers, a hackle feather is given two or three turns around shank; thread is wrapped around and surplus feather clipped off; 5, making a true pair of wings; 6, wrapping on the wings, both at once; and 7, the finished fly, after thread is wrapped several times over the clipped ends of the wing feathers, to form the insect's head.



flytiers gather feathers and hairs from all parts of the world. When unable to obtain the exact shadings desired they sometimes resort to the dying of the natural feathers and hairs. They consume large quantities of dyed wool, this being used principally for the bodies of the insects imitated.

There are five insects that are more assiduously imitated than any others, and the expert knows these when he sees them along a stream. They are: stone fly, caddis fly, alder fly, true fly and mayfly. They are reproduced in their various life stages, starting at the larva, or nymph stage.

These same varieties of trout food have been imitated for at least a century so that the materials for creating them in every part from head to tail have been somewhat standardized on both sides of the ocean. Thus Alfred Ronalds, famed English flytier of a centry ago, gives these detailed instructions in his book, "The Flyfisher's Entomology," for making a stone fly: Body, hare's ear mixed with yellow worsted, ribbed over with yellow silk. Tail, a mottled stand or two of a partridge feather. Wings, feathers from a pheasant's wing. Legs, hackle stained greenish brown. Horns, two rabbit's whiskers.

Today you go to the Angler's Roost and ask Mrs. Greig for materials with which to make a stone fly and she will dig out of stock these same feathers and hairs, or something that's very close. There are several hundred different items in a stock of flytying supplies, and it is by no means a haphazard collection of stuff. Each item is well known by name in the trade and among the professional and amateur flytiers.

Almost all of these feathers and hairs are imported from the Orient, and the quantity is surprising. One large feather importing concern in New York is devoted 99 percent to obtaining materials for making fishing flies. Most of the importers serve both the millinery and flytying trades. There are hardly any domestic sources of these materials, even though the neck feathers of roosters are among the

most standard of all. In this country we kill our roosters while they are young, before these hackles have become stiff enough to satisfy the flytier. During the war it was necessary to use domestic feathers, and the quality of flies suffered accordingly.

The hackle is used to imitate the legs of an insect, and each one calls for a slightly different color. The best hackle of all comes from the neck of the game cock after he is two or three years old. The jungle cock of the Orient furnishes hackles for certain trout, bass and salmon flies, and these feathers come pretty high. Other birds that produce large amounts of flytying feathers are peacocks, ducks, golden pheasants, macaw, and English kingfisher, but only a relatively few feathers from any one bird are usable in first class flies.

Hairs for flies are just as carefully collected and culled, for they have to be just the right color and texture to produce the insect imitation. We get deer and squirrel hair in this country, but import polar bear hair from Canada, and many kinds of fur from all parts of the world. Some colors are obtained by dyeing natural hair and feathers but as a rule the natural color is preferred when it is obtainable.

Besides feathers and hair, flytiers consume a lot of wool, floss, tinsel and fine silk thread. It is the tying thread that binds all parts together on the hook shank so that the assembly will stand the whipping of the fly-caster.

The beginner who tries to

Here's the size range—a sub-midget trout fly and a salmon giant. You yourself can make 'em both.

Left, the Royal Coachman, surrounded by the materials from which it is made: (going clockwise) peacock feather for body; duck breast feathers for wings; rooster hackle for fly's hackle; red floss for center of body; and golden pheasant feather for tail. Right, Elizabeth Greig with a salmon fly which she completed in seven minutes.

tie flies without instruction in the art is likely to have a tough time of it. Some ingenious methods of tying have been evolved through the centuries—for flytying dates back to the fifteenth century. A good many books have been written, and some contain beautiful color plates of time-tried flies as well as detailed instructions for choosing feathers and hairs and for fastening them properly.

Few tools are used, but all are essential. First in importance is the flytying vice with pointed jaws to grip the hook firmly. Next is a pair of clamps called hackle pliers, used to grip the free end of the thread and hold the end of a hackle while it is being wound around the shank. A pair of fine-pointed scissors is needed to clip off butt ends close to the wrapping.

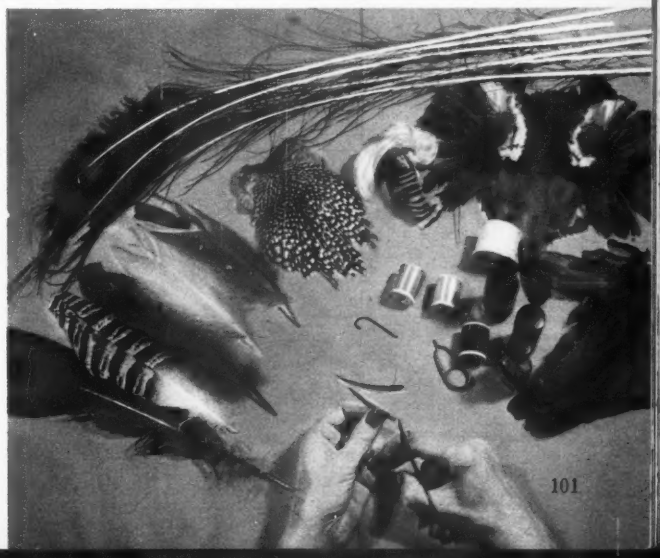
Supplies needed, aside from feathers and hair, are fine silk thread of several colors for wrapping, floss and wool for bodies, also of various colors, wax, lacquer and cement. Several manufacturers are now turning out beginners' kits of feathers and hair. They contain enough varieties to make a good many different flies of standard pattern.

To start making a fly, you clamp the hook in the vice. Most tiers have the eye end of the hook at their right, and wind the thread with the right hand while holding the material in place with the left.

A start is made by wrapping thread several times around the shank, tying it under the starting end and winding toward the hook end. The tail hairs or feathers are placed first and secured by two or three wraps. The difficulty for the beginner is to get the tail perfectly centered and pointing straight back. If both hands are needed, the free end of thread may be clamped in the hackle pliers at any time. This is left hanging, to hold the threat taut.

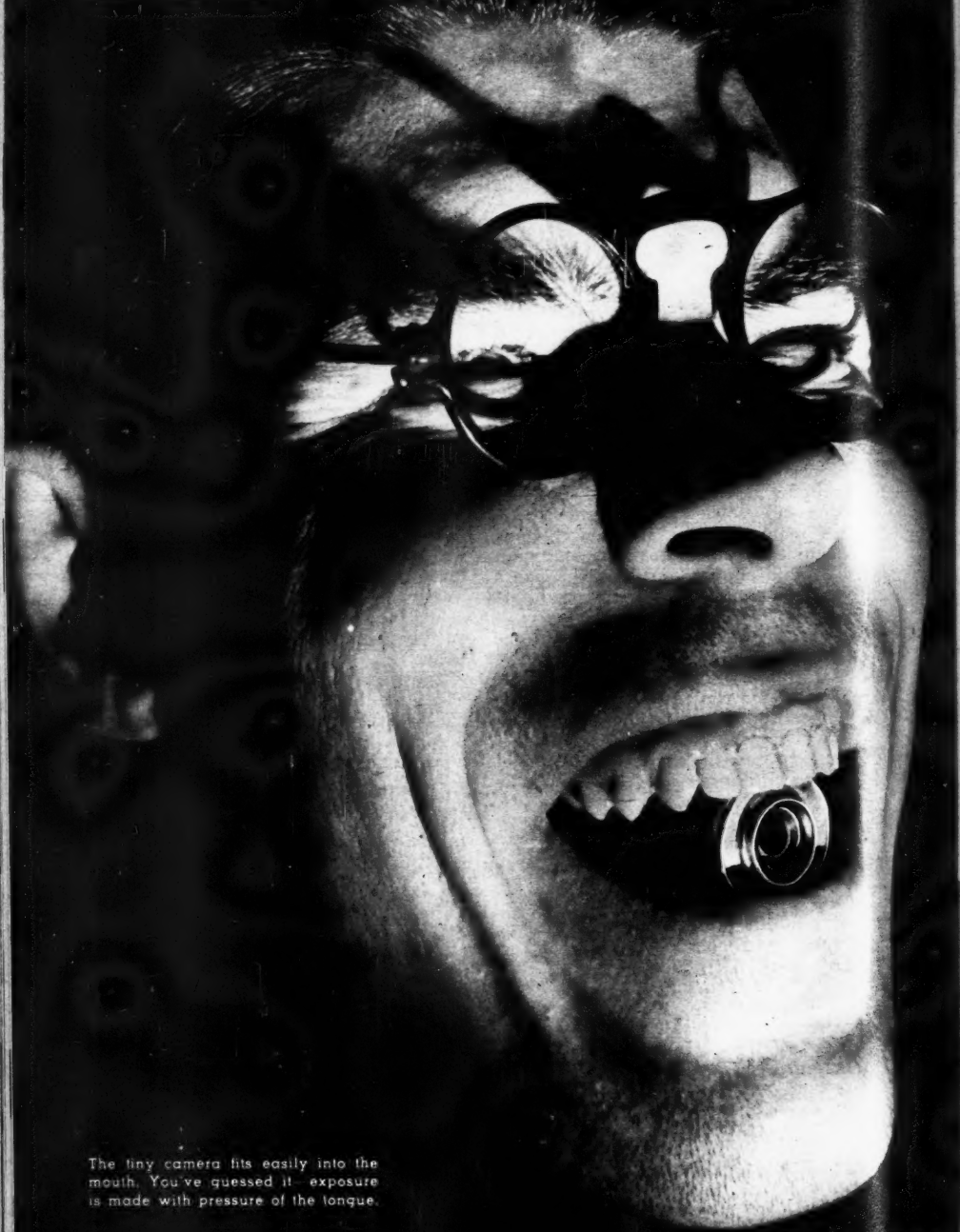
Next comes the insect's body. If it is to be of wool or fur, it is wrapped or spun around the free thread for an inch or so, then the thread is wound round the shank progressively toward the head. The fur or wool is thus evenly placed on the shank, making a neat, symmetrical body.

The winding thread is now near the eye end, and the next thing is to apply the hackle at this point. A hackle feather is prepared so that the fibers of both sides point in the same [*Continued on page* 162]

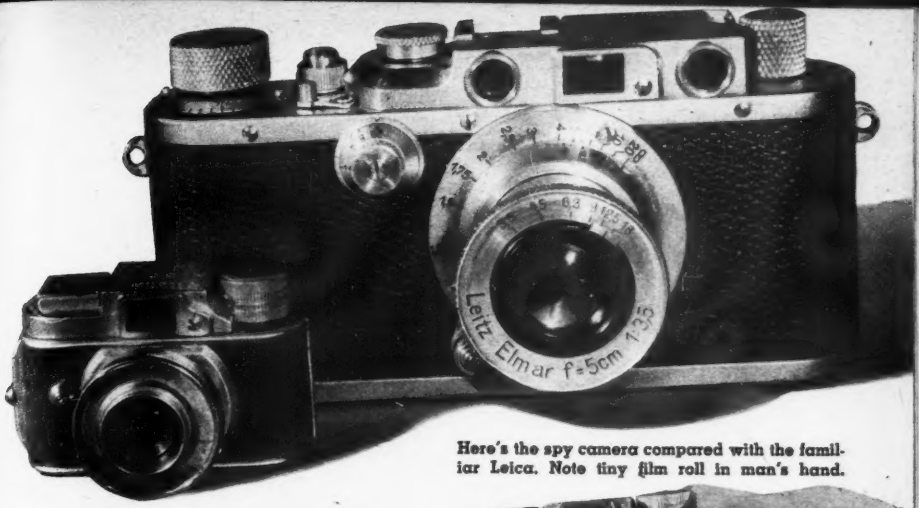


These are all the materials needed for making the fancy salmon fly, the Jock Scott.

EYE for a SPY



The tiny camera fits easily into the mouth. You've guessed it—exposure is made with pressure of the tongue.



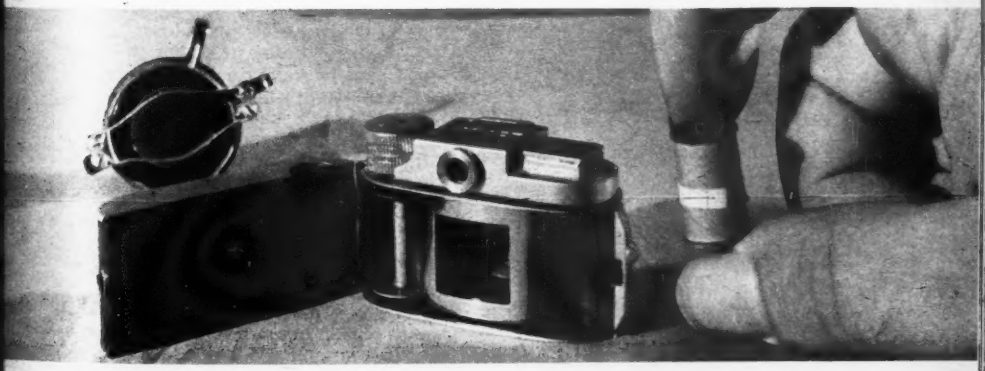
Here's the spy camera compared with the familiar Leica. Note tiny film roll in man's hand.

This camera—less than two inches wide—was used in some unexpected places, including a Jap spy's mouth.

WE COULDN'T believe such a thing existed—a camera less than two inches long capable of taking ten exposures. We wrote back and said so. Bob Fraser of Seattle, Washington, had told us about it; said he bought it in Japan for $1.20. Bob promptly mailed it to us. Well, seeing's believing. Here it is compared with the familiar Leica. The roll of film you see in the man's hand is 14 mm wide and makes pictures about 9/16-inch square. The anastigmatic lens is fixed; no focusing is necessary with such a short focal length lens. Exposure is made with pressure from the tongue; no one hears the click but the spy. The baby camera, called the Midget Jilona, was made in Germany. •

Photos by L. Hochman

It's a real camera—even has a filter attachment. Loaded, it takes ten pictures without a refill.



Heart Attack

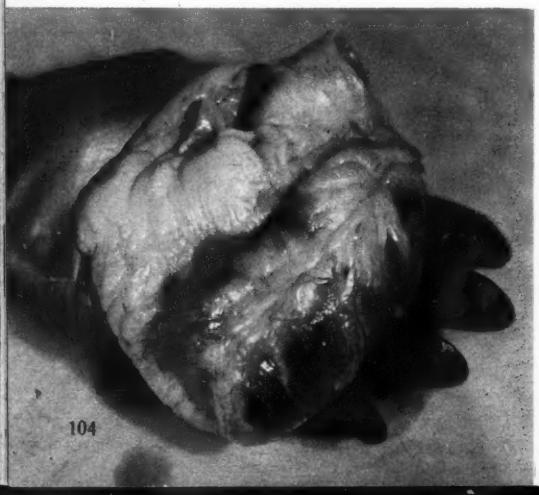


Photo by L. Hochman

YOUR heart just doesn't look like those pretty red heart shapes on valentines. It isn't nearly as pretty. It's not bright red. It's not flat. It isn't shaped like a valentine.

In your body your heart is shaped more like your fist. It has no sharp point and it's slanted at an angle. Its color is a dull reddish brown, more brown than red, not very pretty or romantic.

The heart is a pump made of smooth muscle. It's a duplicate of the one pictured—much more like the beef heart your butcher sells than any on a valentine. •

Half-Pints' EXPRESS

Photos by Free-Lance Photographers Guild

WHEN the half-pints pile into the new Express in Hollywood's Griffith Park, they don't have to repress any feelings of shame at bothering with kid's stuff. This train is the real thing. It's an exact 1/5 scale model of General Motors latest locomotive, the F-3. Cost? Fifty thousand bucks! You can't very well call that kid stuff.

The locomotive consists of two separate cars, each one powered by a 4-cylinder, V-type, 4-cycle, air-cooled industrial motor totaling 44 hp. Power is transmitted from the motors to 16 drivers through a *fluid drive*—just like those featured on many of the better automo-

Above: The engineer is the envy of all the half-pints because running this locomotive is all but the real thing. Below: "Can't I drive . . . please, mister?"

biles. Reversible transmission permits the same speed backward as forward. The entire locomotive is 20½ feet long, 33 inches high and 30 inches wide. With full power it develops 800 pounds of "drawbar pull."

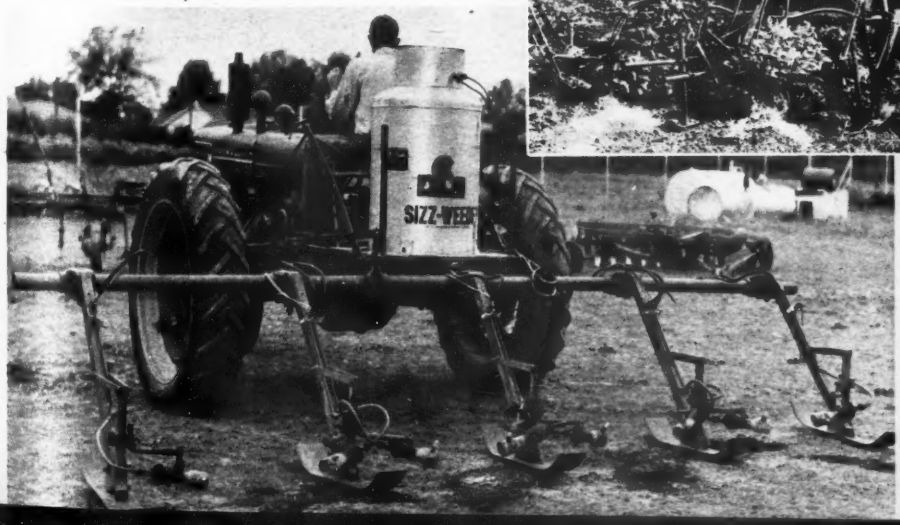
The coaches—there are four of them with capacity of 12 passengers each—have the same "trucks" as those used on the newest streamliners.

The locomotive's instrument panel has practically everything including a speedometer, tachometer, oil temperature, ammeter, gas and oil pressure gauges. Each one is illuminated.

Construction is all-steel throughout. Every wheel on the entire train, including the locomotive, coaches and observation car has air brakes. This feature, along with a low center of gravity, is said to make relatively high speeds safe. Brakes have adjustable clasps and shoes are of heavy molded composition easily renewed. Air cylinders are of stainless steel and are dust proof. After riding and looking this one over, kids will know more about grown-up trains than most adults. •

weed burner

THOSE long-suffering humans whose back-breaking job has been the hoeing of weeds may look forward to salvation. Weeds are now being burned instead of dug up. Many crops, such as cotton, can resist flames which destroy weeds. When cotton is about six inches high, a 2,000-degree flame can pass briefly over it without harmful effect, while weeds wither and die. At top is a flame-throwing machine used by the USDA near Stoneville, Miss., to kill weeds along fence rows. Below is the four-row "Sizz-Weeder" for cotton. At right, another model of the Sizz-Weeder is shown "cultivating" a cotton field. •



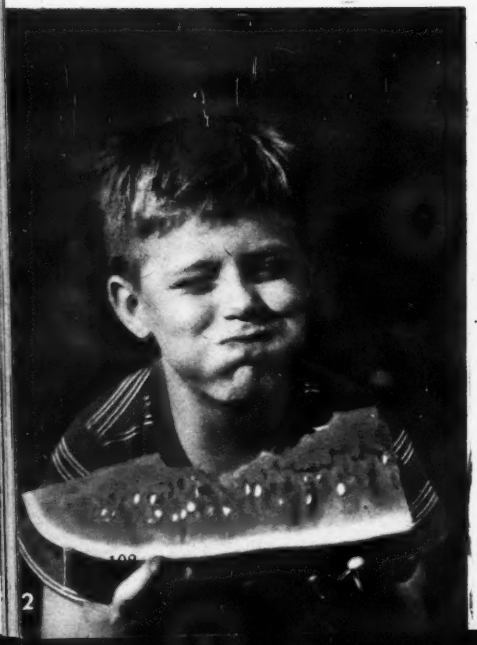
WINNERS

1st Prize .....Autumn
$100.00 goes to Peter E. Ruggles of Detroit, Mich. for this 4x5 Kodachrome. It was taken with a Korona camera and a foil reflector.

2nd Prize ....."Mm—yum"
$75.00 is awarded to Ben Mitchell of New York City for this nostalgic picture of eating pleasure. Taken with a Speed Graphic on Ektachrome; 1/10th, f-6.3.

3rd Prize .....Judy
John P. Strang of West Hartford, Conn., won a $50 award for this 2¼x2¼ Ansco color shot. A charming subject, well executed.

4th Prize .....Night Life
Stanley R. Gold, another New Yorker, captured the gayety of the metropolis and $25.00 for himself, for this scene on Ansco film.



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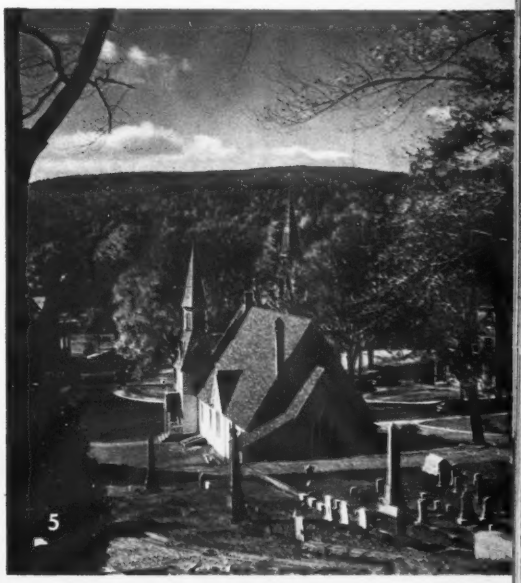
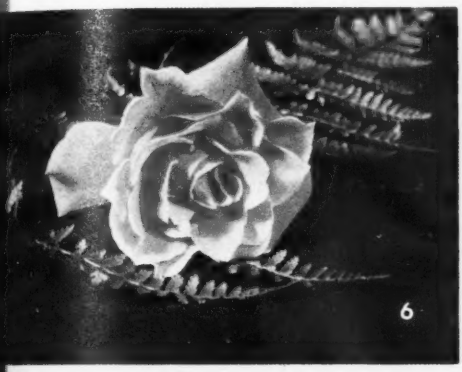
In MI's Fourth Annual Color Photo Contest

AGAIN the time has rolled around to present on these pages the winners in MI's Annual Color Photo Contest. The response to our contest this year was even more enthusiastic than the last year's event. The hundreds of entries received gave the editors of MI a mighty tough time before the actual selections were made. The six winning entries were finally determined by a vote conducted by MI's staff.

If your entry did not receive a prize, it is not any indication of a lack of merit; there simply isn't enough room on these pages to print all of the superlative pictures and transparencies received. The ones reproduced on these pages are the best. •



5th Prize .....Elegy in a Country Churchyard $25.00 to Marynn Ausubel of Long Island City for this Ansco color transparency of New England in the fall. Taken with a Rolliflex; 1/50th at f-8.



6th Prize .....Rose and Fern $25.00 awarded to A. Wolff of Brooklyn for an exquisite 35mm Kodachrome; 1/10th at stop f-16.

Slide Junior Slide

A practical method of keeping your youngster in his own back yard—requires no compulsion.

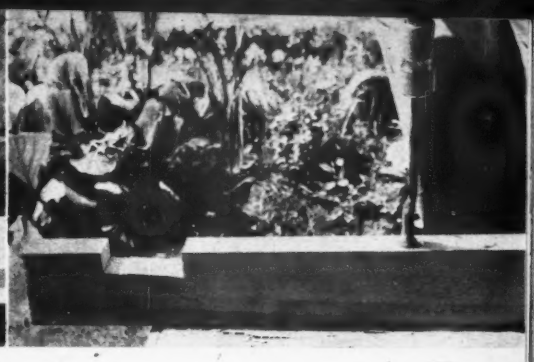
BY EDWARD LUKAS

WHAT better method can you devise to keep your child in his backyard than by giving him a slide of his own? Some 2x4's, Masonite, 1¼ in. dowels for rungs, ⅜ in. carriage bolts, and lag screws plus some miscellaneous lumber are all you will require to put up this private playground.

Start in with the upright tower. This is made out of four 2x4's. Note on the picture that it is braced at the top by additional 2x4's which are inset about 5 in. from the top of the slide.

The ladder leading up to the top of the tower is similarly made out of 2x4's with the 1¼ in. dowels as rungs. The dowels should be inset into the sides at 12 in. intervals. Six dowels will be required for the ladder. The two side rails which support the slide proper are fastened to the tower with ⅜ in. lag screws. This is a very critical joint and should be done carefully as there is quite a bit of strain at this point. Notice that the end of the slide has a horizontal kick-up so as to reduce the speed of the

The supports for the bottom of the Masonite slide are placed 18 in. on centers. Make sure that the supports fit snugly into side rails.

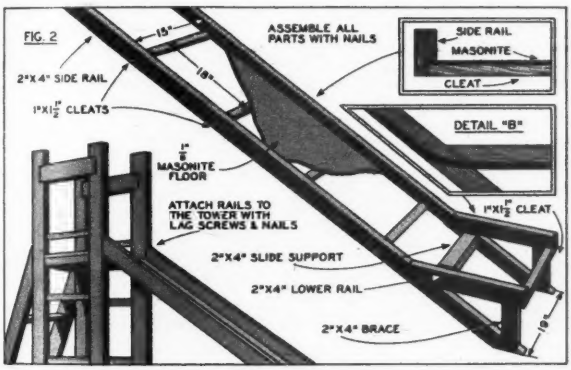


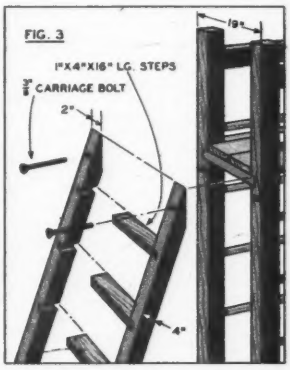
Drilling a hole for the upper 1¼ in. rung in the tower. The post has been notched for one of the two upper rails. Tower rungs are cylindrical.

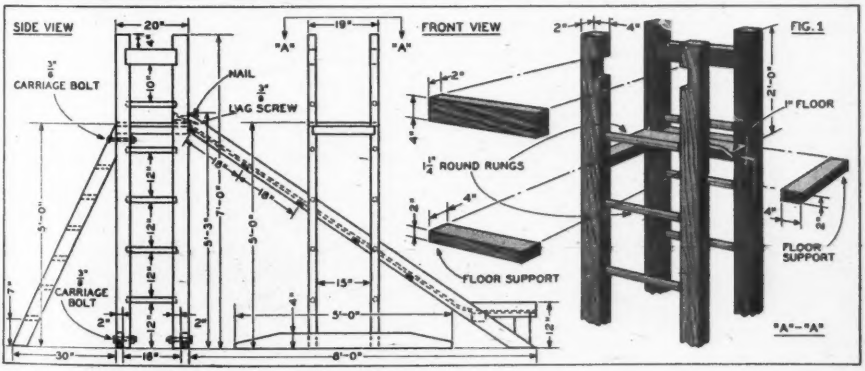
child at the end of the ride. This will also place his feet in the proper position for landing safely.

Masonite was chosen for the bottom of the slide as its composition eliminates the hazard of splinters. It will take the curve at the bottom of the slide very nicely without cracking. Note from the drawing that the ⅛ in. Masonite is recessed into the bottom of the side rails and then additionally supported by cleats. These cleats are spaced 18 in. on centers.

After all the wooden parts have been carefully sanded down, paint the ladder and the side rails a brilliant red. Tower should be painted yellow. Don't worry about the aesthetics of this color combination. Kids like bright colors and after all who is going to use this slide? You or Junior? •







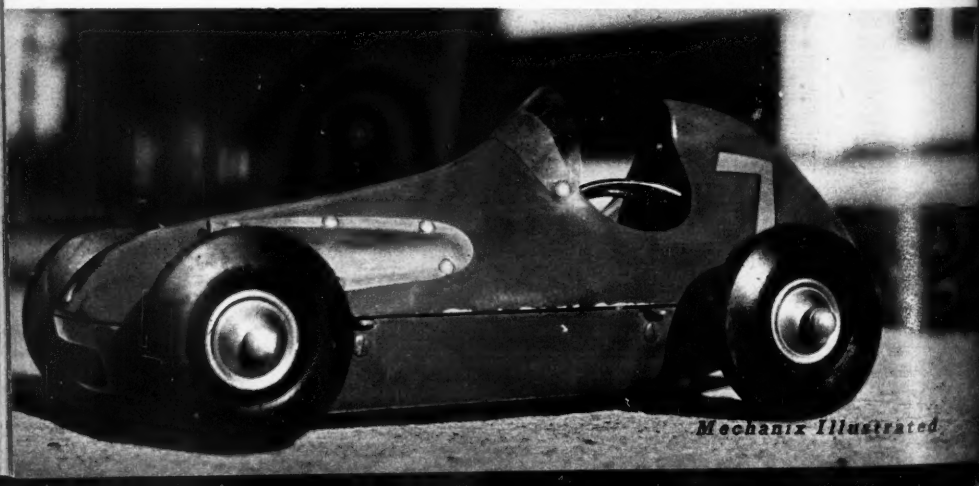
A radical 13-inch all-metal miniature race car designed especially for MECHANIX ILLUSTRATED. Power with any .19 to .49 gas engine.

BY AL SPAMPANI AND RONNIE ALBERT

Looking much like man-carrying midget racers, the MI SPECIAL is well engineered. Drive is on the front wheels through spur gears. Original model used the Forster 29 or Drone Diesel engine. Note scoops on side for cooling.

ONE of the *really* spectacular hobbies in this country today, the building and racing of miniature cars, is steadily increasing in popularity. Simultaneously, the many internal problems the hobby is confronted with, namely the high cost of cars, finding suitable racing sites and the craze for speed, are becoming more and more acute. Look around and count the number of model enthusiasts in your community who can afford to spend a minimum of a hundred dollars for a single car. Look around for a suitable running site and your count in both categories will be low. Plenty low. And when you do find a group of gold-plated hobbyists who can afford to form a club and build their own track at a cost of two or three thousand dollars and more, you'll begin to see the number three problem—the desire for speed.

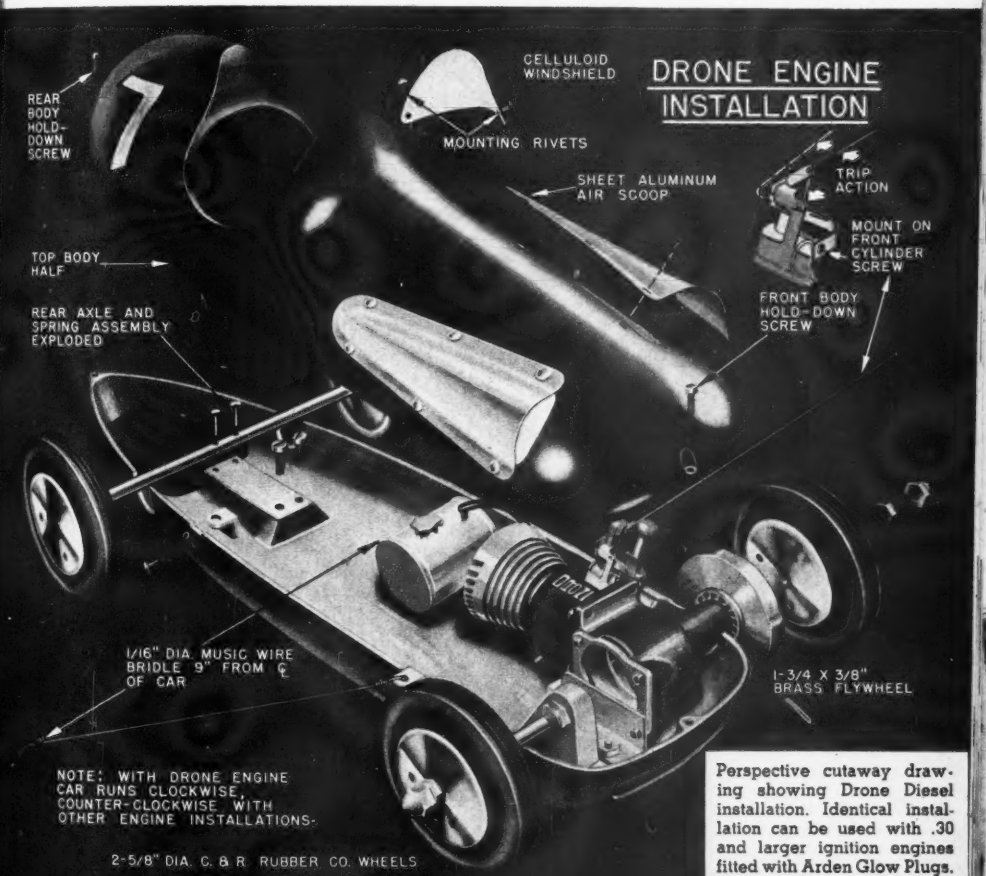
Unless you produce a car that will top 100 mph, you just can't compete in current racing circles.



Most of the boys racing today have elaborate machine shop facilities, the skill to put together hot cars plus the dollar necessary to purchase the best engines and other equipment. Undoubtedly these super hobbyists are responsible for the growth of the sport and the increase in speed, but the fact remains that the ever increasing speed tends to discourage rather than encourage potential enthusiasts. The vision of a 100 mph, three pound car, breaking a cable or throwing a wheel doesn't present too pleasant a picture, and while the American Miniature Race Car Association and similar organizations have established rules which reflect the fine safety record of the hobby, many modelers are actually *afraid* to enter the field!

Thus, if you can't afford more than about 25 dollars for a car, and you don't have a machine shop on the side or a thousand dollar track to frequent, then we think you'll like the MI Special. It's much smaller than the average car found on tracks today

Arthur Fernandez of the Fernandez & Son Foundry, lifts the upper body balsa pattern from a molding box. Castings can be made or purchased. See text.

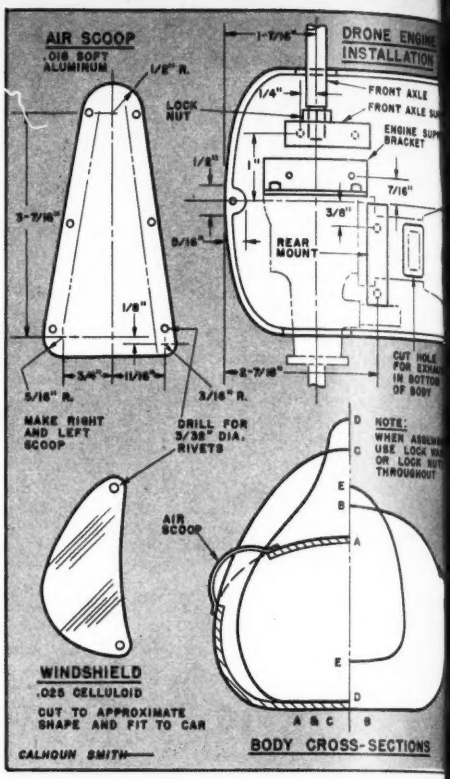


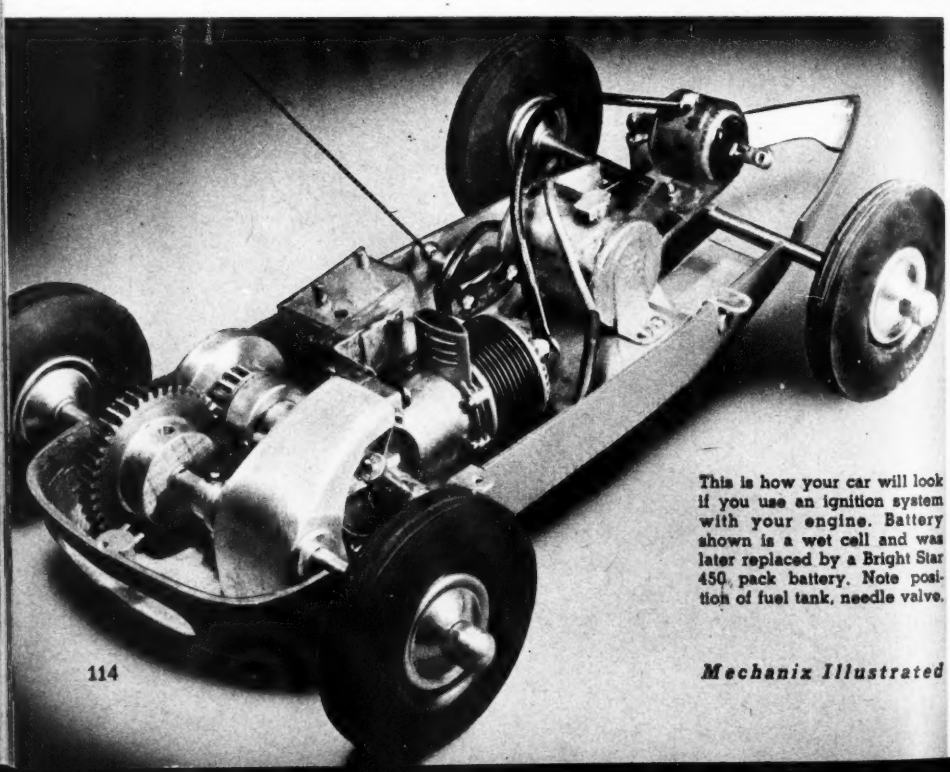
Perspective cutaway drawing showing Drone Diesel installation. Identical installation can be used with .30 and larger ignition engines fitted with Arden Glow Plugs.

and, consequently, can be run in a much smaller area than is normally required. It won't turn in more than about 60 mph (although we know some of you boys will be pushing 100 before long), but you'll have safe performance. The last point we'll try to drive home, for the moment, is that the MI Special looks like a regular man-carrying dirt track racer and not like a flounder fish. One glance at your Special and your friends will know its a race car. You can't say the same thing about most cars on the tracks today.

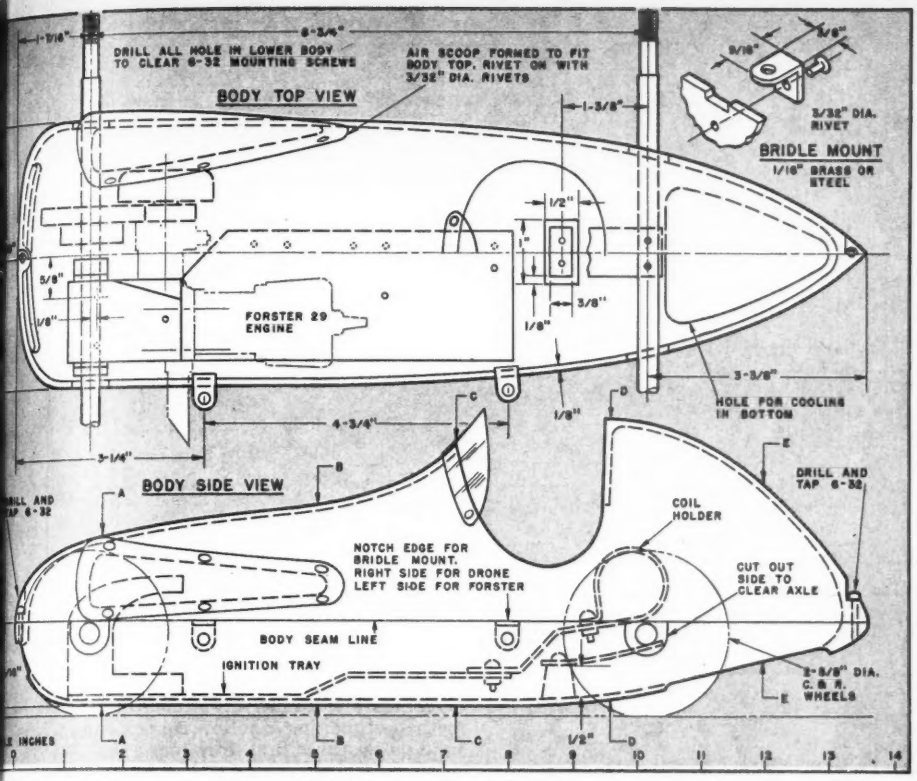
The MI Special was designed and developed over a period of a year and a half. Before the editors of MECHANIX ILLUSTRATED would consider publishing the article, all parts necessary for building the project would have to be readily obtainable either in local hobby shops and hardware stores or via mail. Although 2¾ in. diameter wheels from a pre-war Peerless car were used on the original model, arrangements have been made with one of the leading wheel manufacturers in the country, the C & R Rubber Company of Haywood, California, to produce and distribute through hobby channels a set of four wheels. These are by far better than the Peerless wheels and certainly should reflect in the performance of the car. Best of all, they're more economical.

The MI Special is cast from aluminum and consists of one upper and one lower





This is how your car will look if you use an ignition system with your engine. Battery shown is a wet cell and was later replaced by a Bright Star 450 pack battery. Note position of fuel tank, needle valve.



shell, which can either be poured at your local foundry if the cost isn't prohibitive, or obtained direct from the foundry that made the original castings. For further information, write: Race Car Castings, c/o MECHANIX ILLUSTRATED, 67 West 44th Street, New York 18, N. Y.

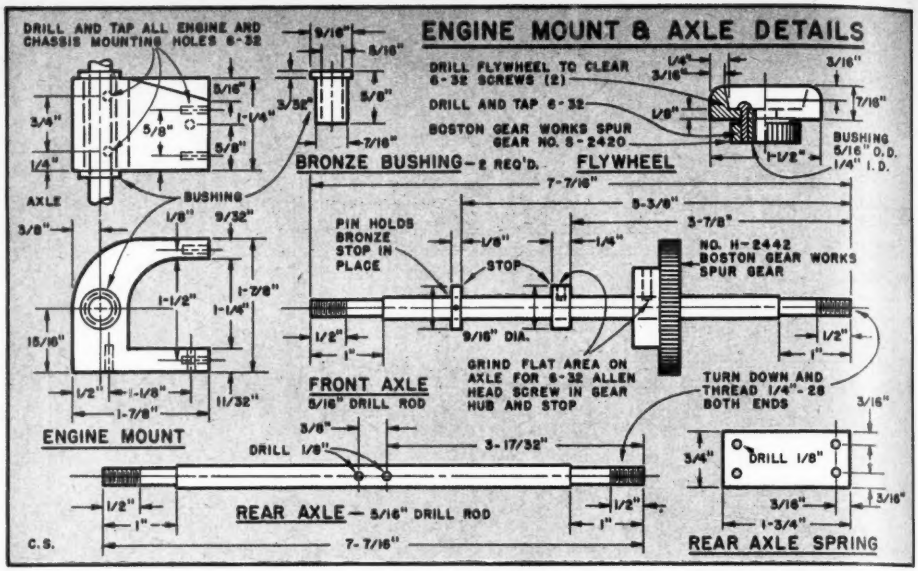
The MI Special was initially powered with the Forster 29 engine, through 2-1 ratio steel spur gears driving the front wheels. An ignition system was used and although the interior was rather cramped, performance was nevertheless good. When the Drone Diesel engine became available, it was decided to install this engine because it would (and did) make running easier. The terrific power developed by the Drone made it possible to hook up one wheel directly to the crankshaft, thereby eliminating the motor mount and gears previously used. Now that Arden Glow Plugs are replacing more and more ignition systems, you can, if you like, forget about your batteries and coil and use either the direct or gear drive. If you contemplate installing any regular ignition engine having a displacement of less than .30 cubic inches, do not use the direct drive.

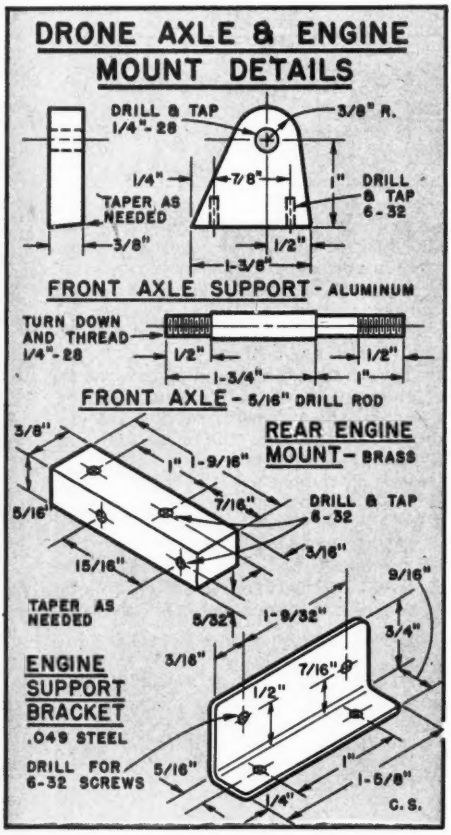
As mentioned previously, you can have your castings poured locally. And you needn't make elaborate patterns if you use the following procedure. Consulting your full size plans, carve an upper and lower shell from soft balsa, making certain no undercuts exist. Sand smooth and then fill the pours with wood filler.

Working with your foundry technician, place one pattern into a 15 x 20 in. molding box and fill the box with sand. Turn the box over and remove the balsa pattern. Now sprinkle talcum powder in the indenture made by the pattern and then fill with sand. Place another molding box over the first and fill this also with sand. Turn both boxes upside down and carefully lift them apart. You now have a male and female impression. The next step is extremely important because it determines the wall

FULL SIZE PLANS . . .

If your hobby dealer cannot supply you with full size plans, send 50 cents direct to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut, and specify Plan No. 385. Orders will be filled the same day received. Mail for your set today!





thickness and interior smoothness of your casting. Using a shaft knife, cut a 1/8 in. layer from the male mold. Your foundry will know where to cut the opening exit for pouring, which will require slightly more than a pound of aluminum. This method of making a hollow casting from a solid pattern was first introduced to us by the Arthur Fernandez and Sons Foundry to whom we are greatly indebted.

After you have both shells, smooth off the flat section where they join, using a wide belt sander or by rubbing each shell on a concrete floor. When the edges fit together, clamp them in place and drill the front and rear holes, with a No. 36 drill. Tap the lower shell 6-32 for the Allen head cap screw and ream the upper shell hole. The holes for the cooling vents can now be cut in the top shell and the joints filed smooth.

Your engine will decide just where the castings will be cut to make way for the exhaust, air intake or, if you're using direct drive, the engine crankcase. Regardless of which engine installation is used, the rear axle assembly will be the same. Turn this from 5/16 in. drill rod and rivet the .049 steel spring in place. Bolt the spring to the stub in the casting. Remove the axle assembly and set aside until after the engine is mounted.

DIRECT DRIVE INSTALLATION

Direct drive eliminates the gears and consequently simplifies construction. If you use a Drone, cut the rear mount from brass and taper it so the engine will be inclined slightly. This will bring the crank-

case center lower to the shell bottom so the body will have adequate ground clearance. The engine support bracket is bolted to both the crankcase and shell, as indicated.

Naturally, if you use another type engine, the size of these parts and the dimensions of the mounts must be altered. When doing this, carefully calculate the engine angle so you have about 3/16 in. or more clearance between the body and the ground.

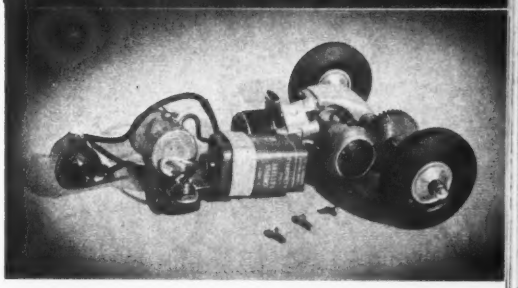
The free turning right wheel is screwed into a piece of ⅜ in. thick aluminum, as shown. Since the axle does not turn, this wheel also requires a brass or bronze bushing. The Froom fuel tank is bolted to the bottom and the fuel line set so it reaches the outside of the tank. When the car is running, centrifugal force will push the fuel to the outside and unless the fuel line is on that side, the engine will stop.

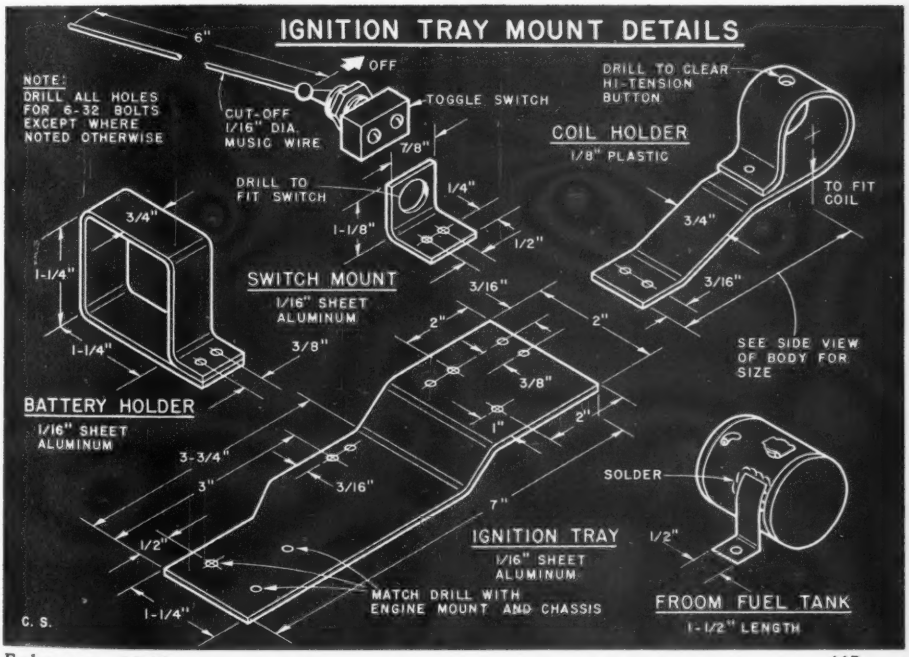
The slots in the casting for the bridle mounts can now be filed and the 1/16 in. brass or steel brackets riveted in place.

GEAR DRIVE INSTALLATION

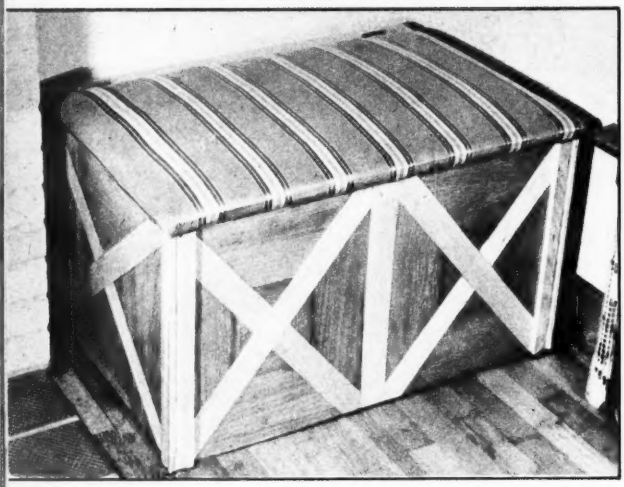
When using any of the smaller bore ignition engines (.19 to .30 displacement) the gear drive is necessary. The engine is mounted on a U-shaped removable mount which also contains the front axle. The entire front drive unit can be instantly removed from the body shell by first removing the three [*Continued on page* 156]

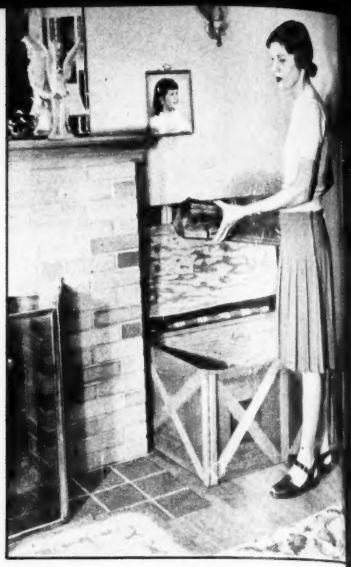
Above. Upper and lower body shells. Scoops are riveted in place after shell is painted. Below. The engine, ignition system and front wheel assembly are instantly removable for trouble shooting.





Fireplace Seat *and* STORAGE BIN





Bin is wide enough to store 2-ft. lengths of firewood with an ample top that's welcome for extra guests.

A smart hassock that knows enough to store wood in its innards for the fire.

THIS dual purpose wood box and seat will more than justify the favored space allotted to it alongside the living room fireplace. The inlaid strips of contrasting hardwoods add much to the charm of this piece of furniture.

The 20x28 in. inside dimensions shown in Fig. 1 are ample enough to accommodate 24 in. firewood. The front and two side pieces are made of ⅜-in. plywood panels, with pieces of ⅜ in. contrasting hardwoods fitted together and glued to the plywood

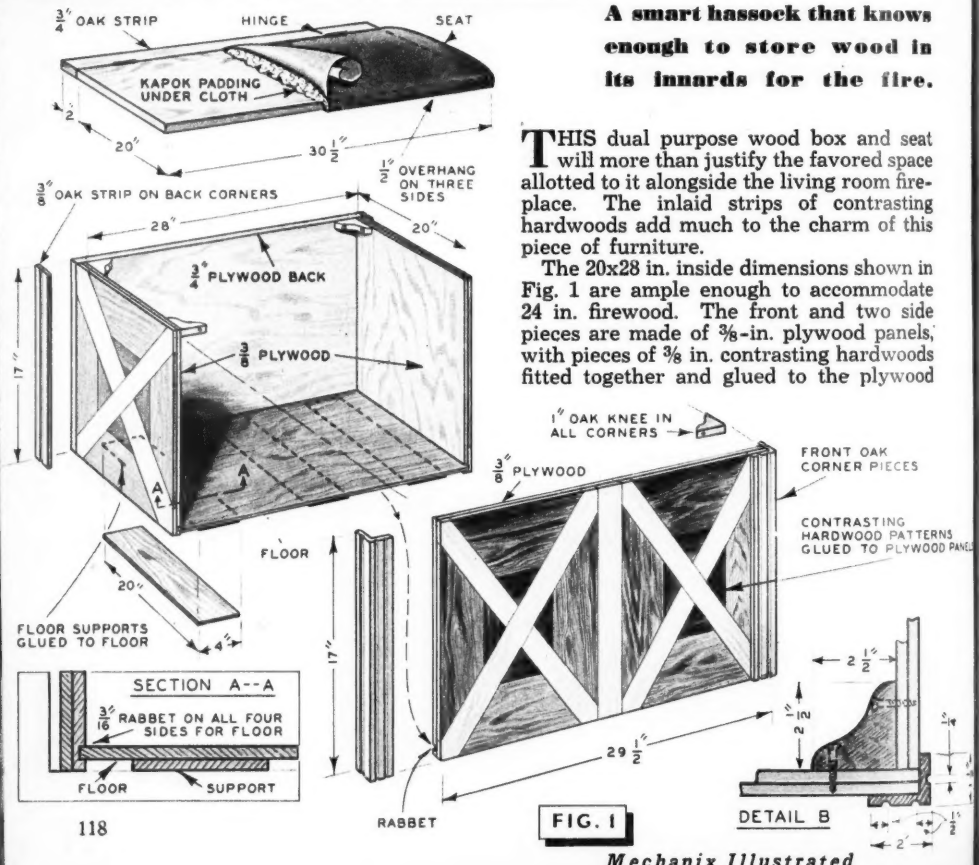
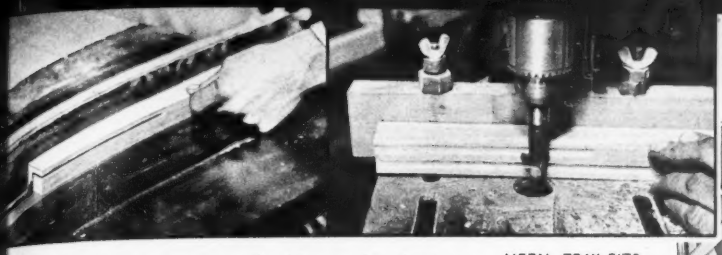
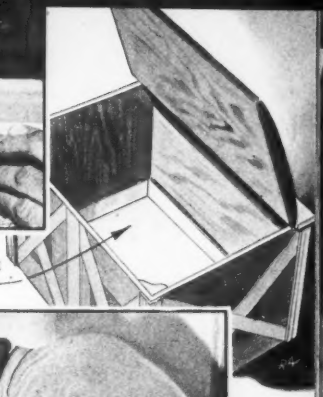


FIG. 1





Left: Cutting corner angle strips on bench saw. Right: Forming grooves with shaper on drill press.

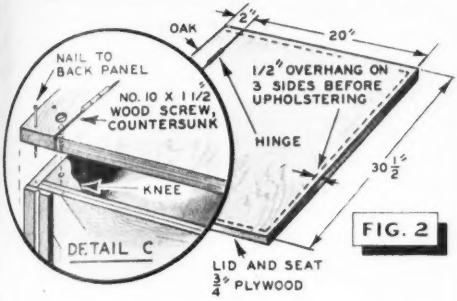


FIG. 2

to form the pattern shown in the photograph. The woods used were oak, mahogany, and maple. Plywood, with ¼-in. inlays will do just as well, but total thickness should not be less than ¾ in. All three sides and the ¾-in. plywood back, are rabbeted as shown, to receive the ⅜-in. thick plywood floor. Glue the three supports to the bottom of the floor before assembling the four sides.

When the glue has set, attach the 1-in. oak strengthening knees shown in detail B, as well as the decorative angle strips. The latter can be made from 17-in. lengths of 1½x2-in. oak ripped out on the bench saw, and grooved on the shaper or high speed drill press. Assemble by gluing and nailing over the corners with light finishing nails, concealing the nail holes, before finishing, with putty. The two back strips need not lap the corners, two flat strips of oak, shaped and installed in the same way, are sufficient.

The seat-and-lid assembly, Fig. 2, consists of a 2-in. wide oak board attached as shown in detail C. It should overhang the side panels of the front and both ends.

A good grade of upholstering cloth of suitable pattern to match the rest of your living room furniture, is attached by tacking to the under side of the seat. Padding such as kapok should be inserted between the cloth and the seat.

Finally, to prevent damage to your living room floor, a tray of sheet metal should be made for the bottom of the box. This will prevent water and pitch from working through to the floor, and will provide a quick and easy method of removing chips. •

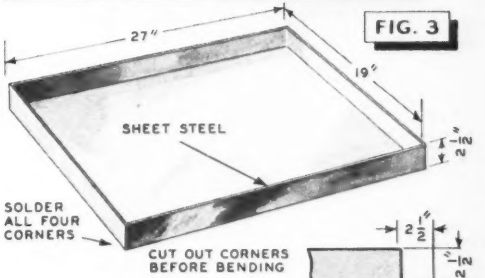
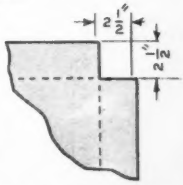
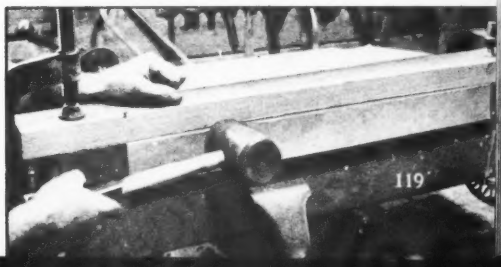
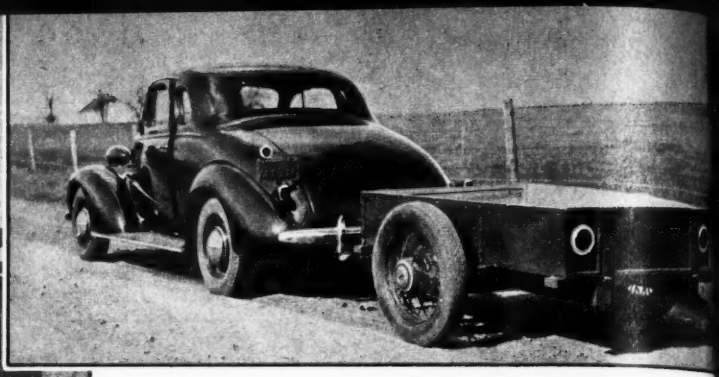


FIG. 3



Details for making the metal insert for the bottom of the bin. Photo directly above: Inserting the tray. Below: Sides are formed using 2x4 as a brake.



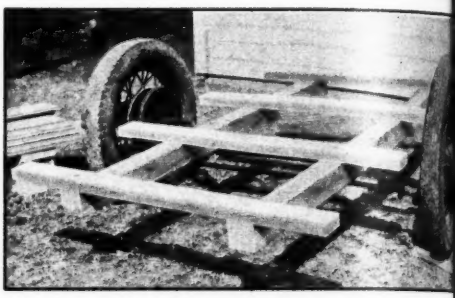


Utility Trailer

Add two wheels and an extra half ton carrying capacity to your car.

IF YOU feel the need for a two wheel trailer with a capacity of up to a half ton, then you'll do well to make your own. And you needn't be a metal worker either because the job described herein is made entirely of wood, with the exception of the axle and minor parts. Built around a front automobile axle, this two-wheeler lacks springs which greatly simplifies construction and makes road handling much easier because of the resulting lower center of gravity. You'll find that when carrying ordinary loads the tires will absorb sufficient shock for smooth handling although we do suggest you avoid extremely bumpy roads if at all possible.

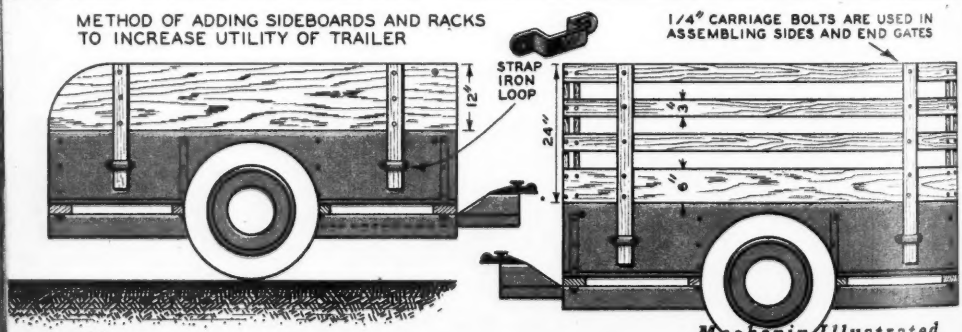
The first step is to track down a suitable axle and a set of wheels. A visit to the local auto graveyard should produce the one piece front axle assembly and two wheels at a cost of only a few dollars. After you have your axle, bend down the steering arm and have it welded to the axle to lock both wheels in position.

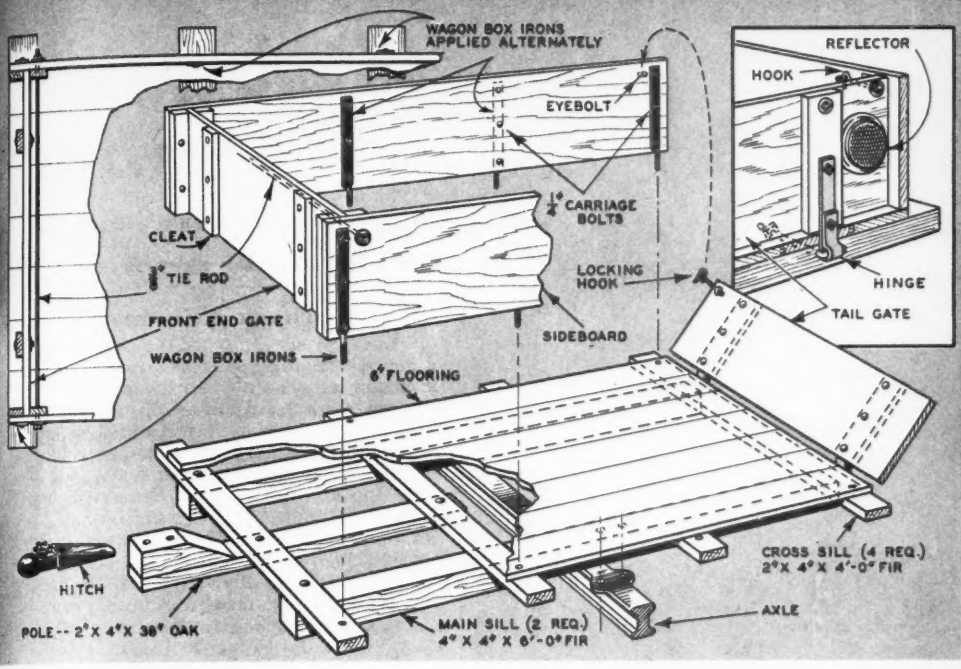


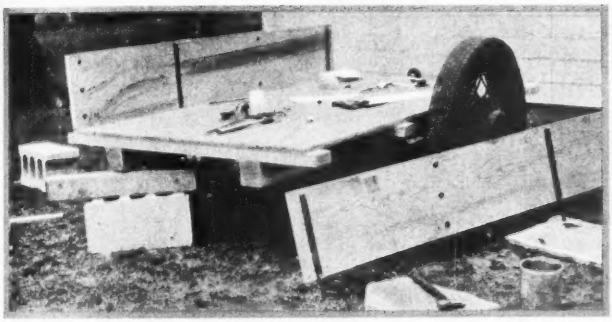
Framework view before 1 in. thick yellow pine flooring was added. Note simplicity of construction.

The main sills, of fir, measure 4 in. square x6 ft. long and are bolted to the axle with ½ in. bolts. After the main sills are in place, the four cross sills, also of fir, are secured at 2 ft. intervals with ⅜ in. bolts. With the cross sills in place, proceed to add the 6 in. wide yellow pine flooring. Note that the cross sills project 2 inches beyond

METHOD OF ADDING SIDEBOARDS AND RACKS TO INCREASE UTILITY OF TRAILER





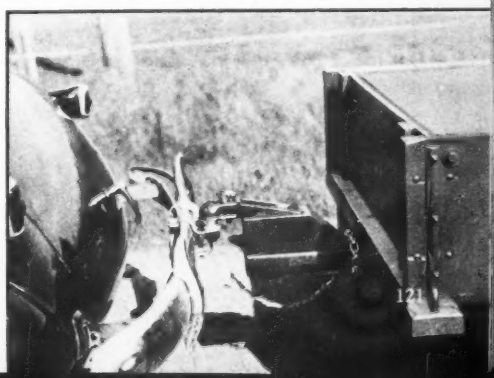


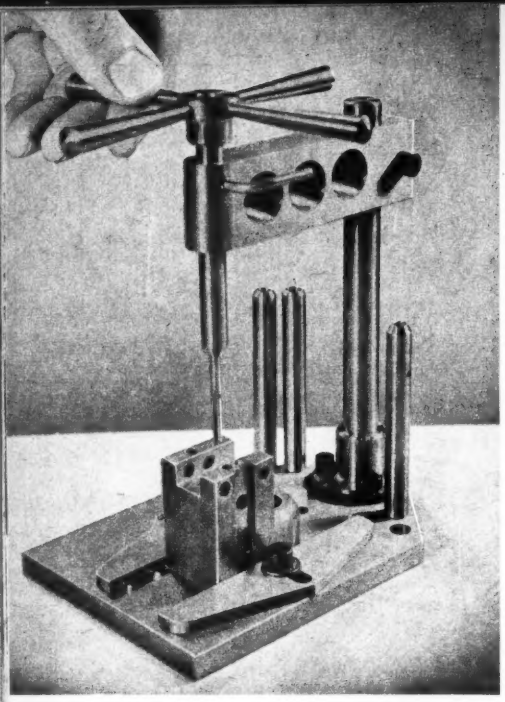
It doesn't look complicated and it isn't. After the side boards are in place, the end panel is added.

the flooring and the side boards, which are cut next, are mounted with wagon box irons. The irons, obtainable from almost any hardware store, are attached to the side boards with ¼ in. carriage bolts as shown. The yellow pine side boards are 12 in. x 6 ft. flooring and have cleats at the front end for the gate, which can be lifted out if desired. A ⅜ in. tie rod is used across the front of the box (see drawing) for added rigidity. The tail gate, also cut from 12 in. flooring, swings on two 6 in. screw-strap gate hinges and is locked with barn door hooks and small eye bolts arranged as shown. If desired, additional sideboards sections for bulkier loads can be easily made and fashioned to the main side board in the manner shown.

The oak pole is bolted to the first two cross sills and projects 11 in. from the end. A 4 in. square block is anchored to the pole tip to make the trailer stand level when hitched to your car. Add an ordinary trailer hook, a few coats of paint, and you now have a trailer which will give you an abundance of service. Hope you like it. •

For ordinary light loads the hitch can be bolted to your car bumper. Always attach a safety chain.





Above: The unit in operation. Work is clamped to the base which insures its being perpendicular with the tap. Holders take taps from 0-80 to ¼-20.

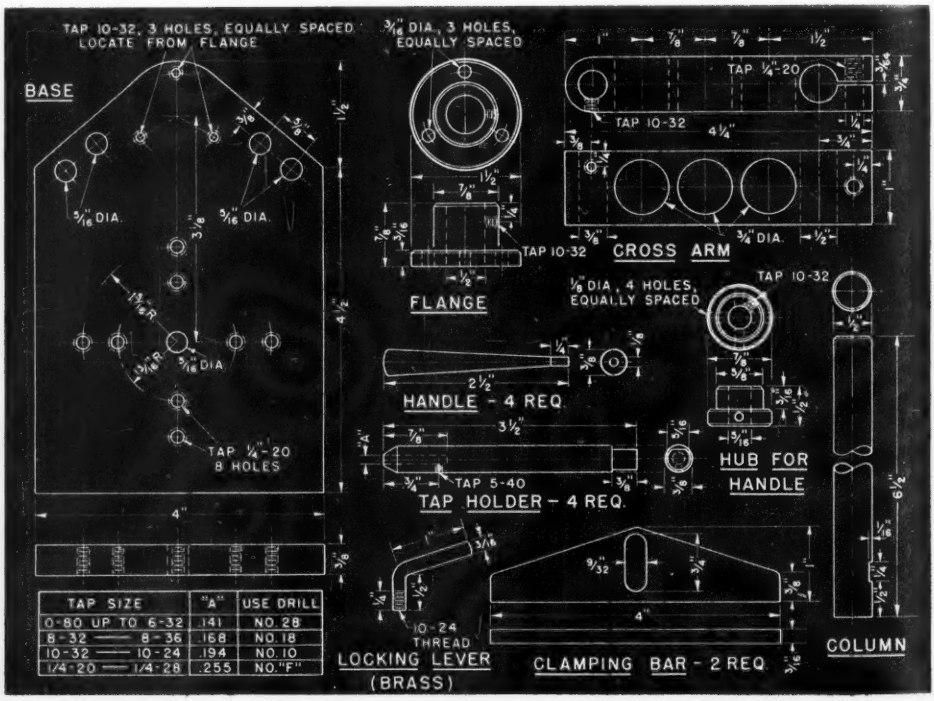
Precision Tapping

is made easy with this simple yet practical machine shop accessory.

BY FRANK McCARTHY

HAND tapping is a rather tricky operation, especially when the smaller size taps are used. A tap broken off in a hole is quite common, and imperfect threading resulting when the tap is not perpendicular with the work is perhaps even more prevalent. In either case, the cause can be quickly eliminated with this simple tapping device. Clamps on the base hold the work perpendicular with the tap, so all you need do is the necessary hand twisting. The fact that only four holders are required to accommodate nearly all tap sizes from 0-80 to ¼-20 makes the gadget extremely practical. Dismantled, the tapper can be conveniently stored in the drawer of a machinist's tool chest.

The unit is as easy to make as it is to use.

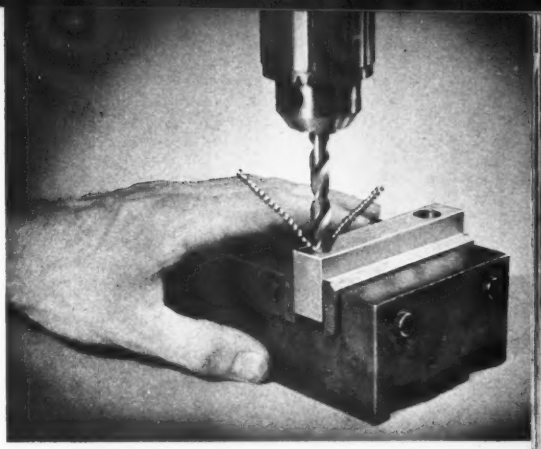


TAP SIZE	"A"	USE DRILL
0-80 UP TO 6-32	.141	NO. 28
8-32 — 8-36	.168	NO. 18
10-32 — 10-24	.194	NO. 10
1/4-20 — 1/4-28	.255	NO. "F"

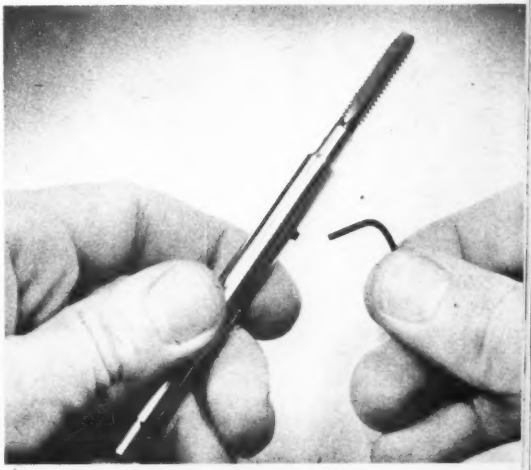
The base is a piece of cold rolled steel, sawed and filed to shape, then drilled and tapped as indicated. The flange is also machined from cold rolled steel. After the three equidistant holes have been drilled, clamp the flange over the base and then spot, drill and tap the 10-32 holes. Drill and tap the eight ¼-20 holes in the center of the base which permit adjustment of the clamping bars. The four $\frac{5}{16}$ in. holes on the V side of the base are for storing the four tap holders.

The clamping bars are next shaped. Note that these bars may be set either horizontally or vertically on the base, whichever may be necessary. The cross arm is shaped to the dimensions shown and the holes for the column and tap holder drilled with the same vise setting to make certain the column and holder will be parallel. Round off one end of the holder, slit the other and then drill the three ¾ in. diameter holes in the side. These holes are merely to reduce weight. Drill and tap one end for the locking lever and the other for the ¼-20 Allen head screw which permits adjusting the cross arm on the column.

The four handles, the hub, the column and the four tap holders are straight lathe jobs. Note that the tap holders, made from ⅜ in. drill rod, are essentially the same with the exception of the hole for the tap. The lower end of each holder is drilled to one of the "A" dimensions given in the table located in the lower left hand corner of the drawing. Use the listed drill as a reamer by first drilling the hole with a slightly smaller drill. The tip of each holder has a 5-40 setscrew which tightens against the square end of the tap. When assembling, use Allen head cap screws. •

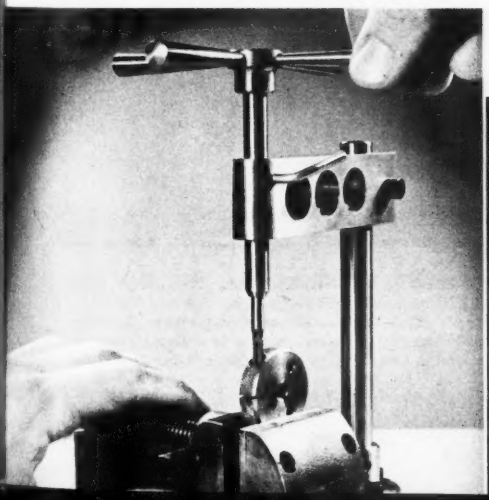


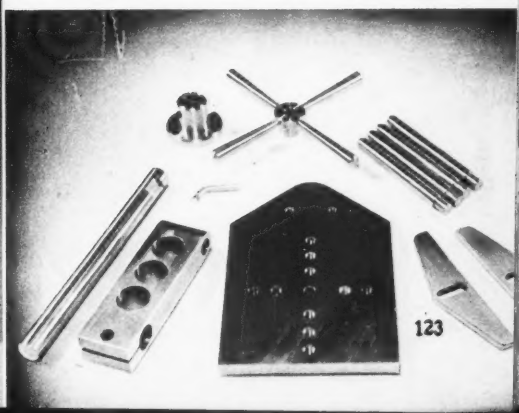
The vertical holes in the arm must be parallel and are drilled with the same vise setting.



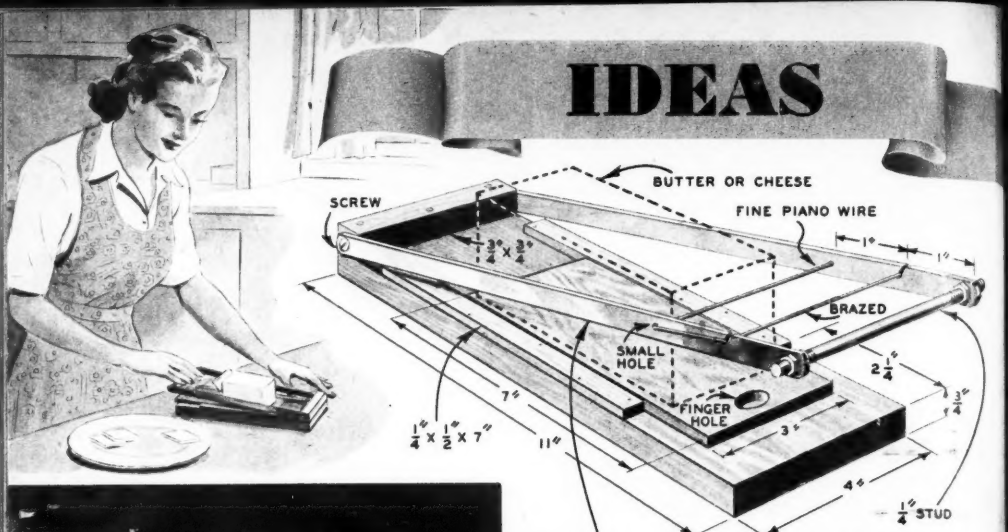
Above: Each tap holder is drilled to accommodate a different group of tap sizes. The tap is held in place with an Allen head setscrew. Below: Finished parts prior to assembly. Column and tap holders are machined from drill rod; base, flange, clamping bar and handle are cold rolled steel. The locking lever is brass.

When the work cannot be held in the base clamps, a drill press vise can be substituted.

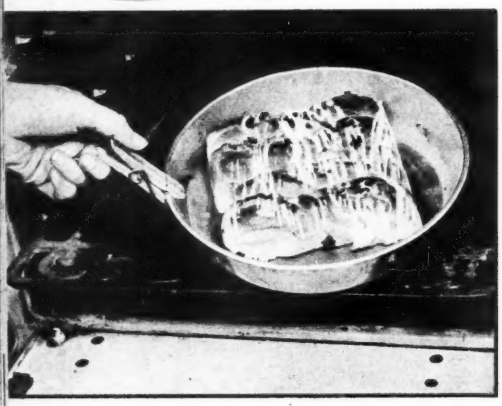




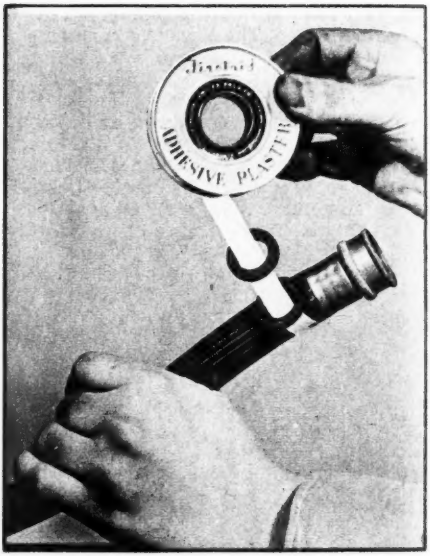
IDEAS



SLICING CHEESE AND BUTTER is usually a very messy job because the food sticks to the knife. With this simple gadget you not only eliminate this trouble but also obtain slices of uniform thickness. The slicer consists of two rugged metal arms pivoting from one end of a plywood base. A piece of .018 piano wire spans the arms at the indicated point and cuts the cheese or butter when the arm assembly is pushed down. The wire is kept taut by adjusting the ¼ in. stud, as shown.



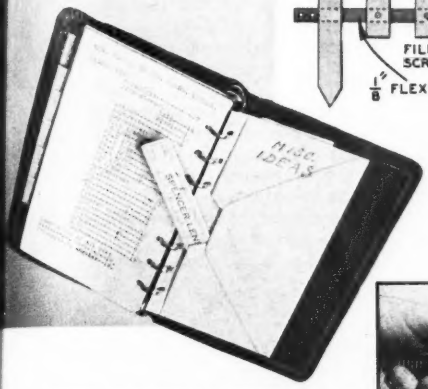
DON'T BURN YOUR FINGERS trying to remove a pan from an active burner. Instead, use a clincher-type clothes pin as a makeshift handle to pull the pan away from the open burner.

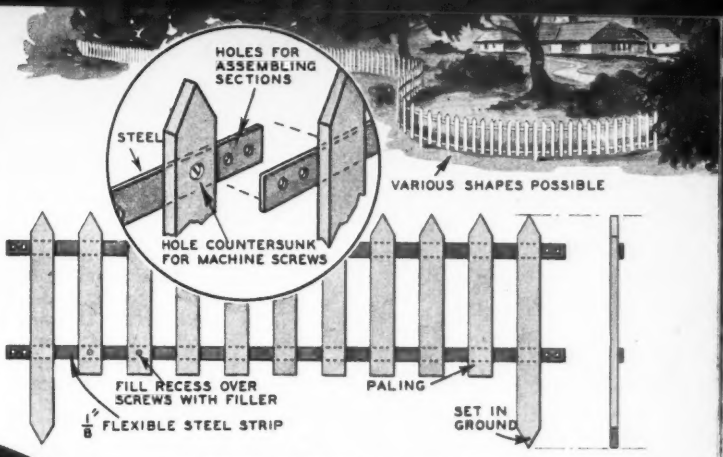


GARDEN HOSE WASHERS often fall from the disconnected coupling when the hose is being removed and stored. Rather than hunt for your box of washers, tape a few extra washers near the coupling so you'll have them available.

IF YOUR KITCHEN CHAIRS scratch your linoleum or else slide too freely, drill a ½ in. diameter hole about ½ in. deep in each leg and force a hard rubber cork in each hole.

A NOTEBOOK POCKET, made from an ordinary letter envelope is a handy place to store small rulers, protractors or other items. Bend the envelope flap over and puncture the lip for the loose leaf rings. Use reinforcements to prevent rings from pulling through.



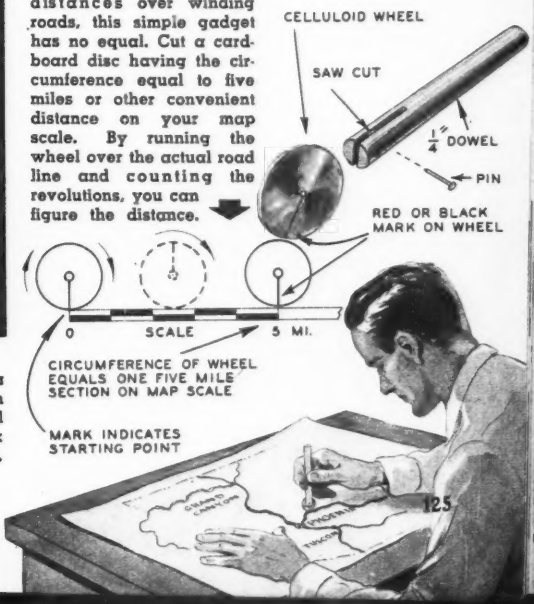


IF YOU'RE LOOKING for a good temporary or permanent fence that can be bent to fit any flower bed or walk, then look above. The fencing is made up in sections, the dimensions of which will vary according to your particular needs and the material available. The back-up rails and thin steel strips are ⅛ in. thick by 2 in. wide bolted to the palings.

WHEN CLEANING REVOLVERS and other weapons from the muzzle, it is very annoying to have the rod slip past the chamber, thus causing the patch to fall off. A simple cure is to slip a length of ordinary dowel stick over the rod and adjust the length so the rod can be pushed only the length of the barrel, plus ⅛ in. The bore can then be scrubbed in a few minutes.

STICK THOSE STRAY THUMBTACKS in a large vacuum bottle cork, keep it handy in a drawer in the kitchen or workshop and you will always have a ready supply on hand. If you lack such a cork, a piece of soft balsa can be substituted.

FOR MEASURING actual distances over winding roads, this simple gadget has no equal. Cut a cardboard disc having the circumference equal to five miles or other convenient distance on your map scale. By running the wheel over the actual road line and counting the revolutions, you can figure the distance.



BENCH and TABLE

for your telephone

THIS telephone table and bench can be made in three hours of actual working time. And their cost, depending on the extent to which scrap material is available, can range downward from a dollar or two to the vanishing point.

Laying out the members that form the brackets will be facilitated if cardboard patterns are used. This is better than drawing the squares directly on the wood.

Dimensions and construction details of the telephone table are given in Fig. 2. The thickness of the stock used for the various parts need not be precisely those shown, and all dimensions can differ slightly to accommodate available material, but it is important that the compartment under the shelf be dimensioned to take standard size telephone books. Allow at least 3 in. for the thickness of your directory.

The shelf is made of two pieces of wood, one slightly larger than the other. The larger piece is screwed to the sides of the compartment and the smaller piece is glued on top, after the edges have been rounded off with a strip of sandpaper. By this means the screws are concealed and the effect of a routed edge is obtained. Wood about ¼ in. thick is good; plywood or solid wood will do.

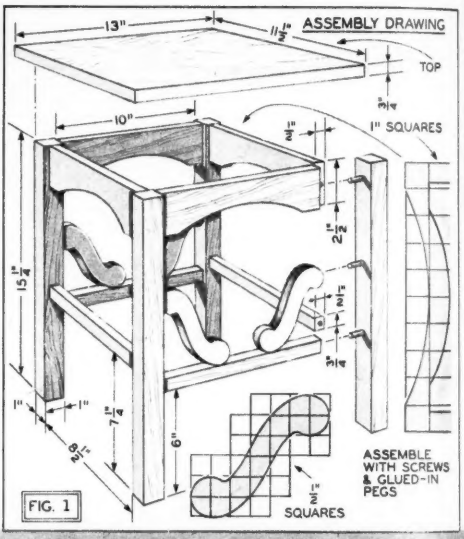
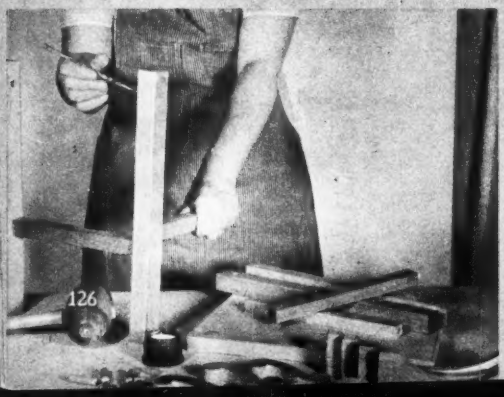
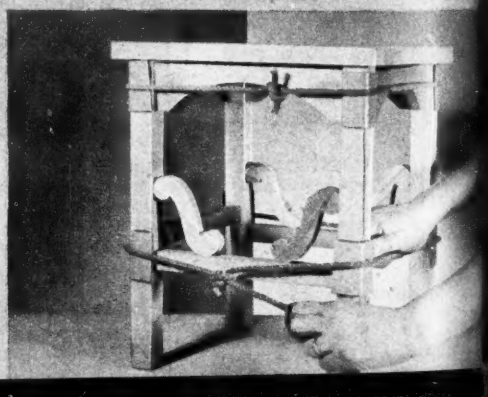


FIG. 1

Stool is assembled with pegs, glue and screws. If woods do not match, use paint as a final finish.



Rope provides the pressure while glue is drying. Curved members of stool match curves in table.

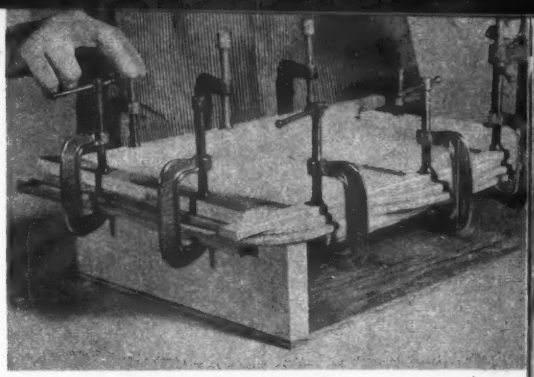


The bottom of the book compartment is screwed to the side pieces. The two members that go flat against the wall plus the two curved members form a supporting pair of brackets. The assembly is put together with screws and pegs. Put the pegs in place before the screws are driven home.

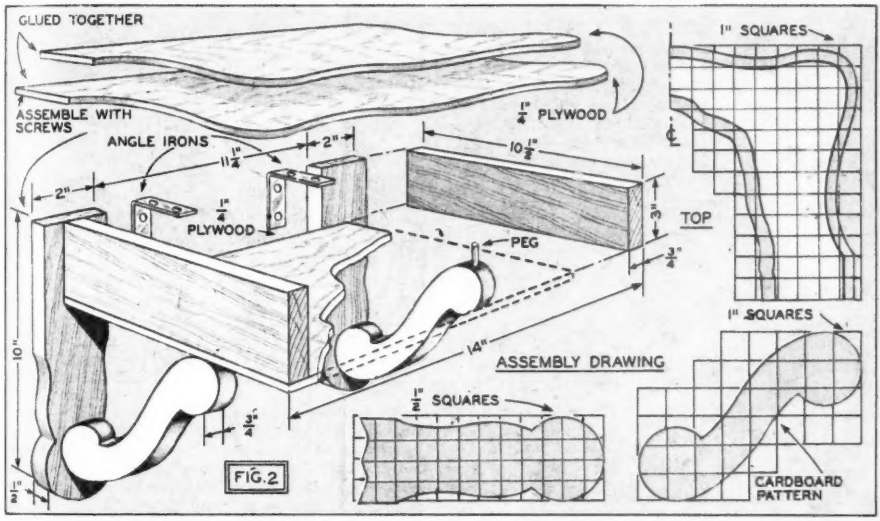
The stool is put together with pegs and glue plus four screws through the four arch-shaped members and into the underside of the seat.

The finish applied depends upon individual taste, but, if in order to utilize scrap, you have used several different kinds of wood, paint is probably the best finish.

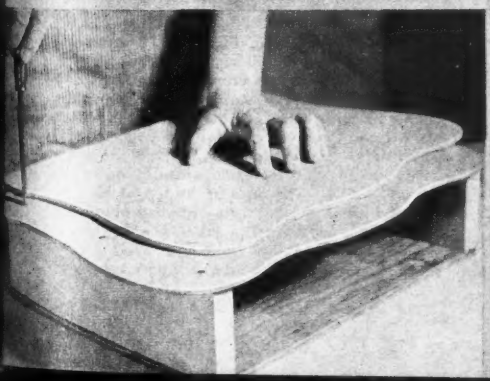
Screw two angle irons to the under side of the telephone shelf. If this is done after assembly, the screws can be reached with a screwdriver through holes drilled through the bottom of the telephone book compartment. Secure the unit to the wall through the angle irons and through holes drilled near the lower ends of the two members that go flat against the wall. If the wall is of the usual lathe and plaster construction, use toggle bolts, countersinking the heads of the two lower ones. Conceal the heads with putty or crack-filler which can be painted over when dry. •



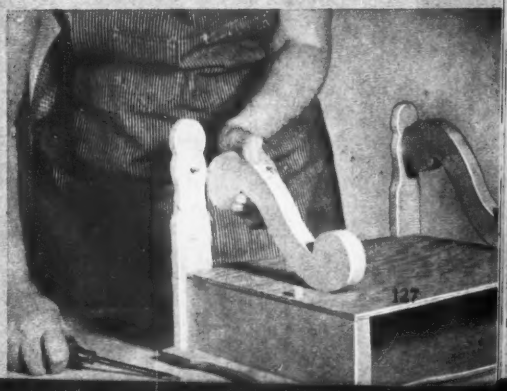
Wood strips distribute pressure of clamps while glue is drying; prevent clamps from marring work.

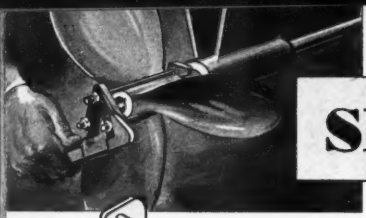


The two-piece construction of the top conceals the screws and gives the effect of a routed edge.

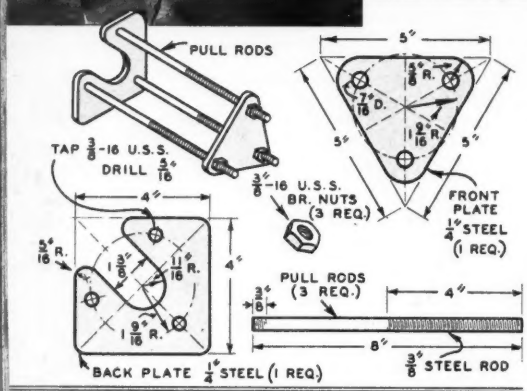


Screws and pegs secure the curved members. All pieces can be cut with a jig saw or coping saw.

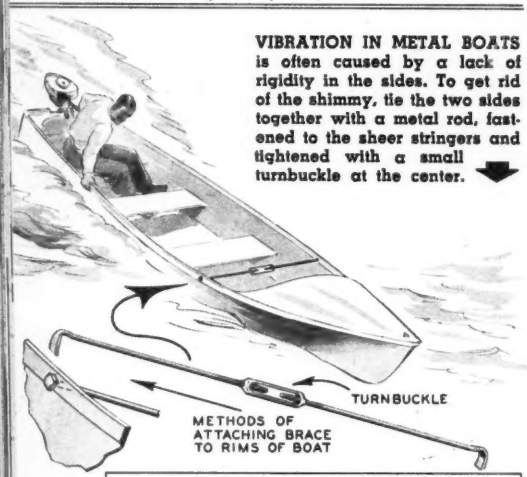




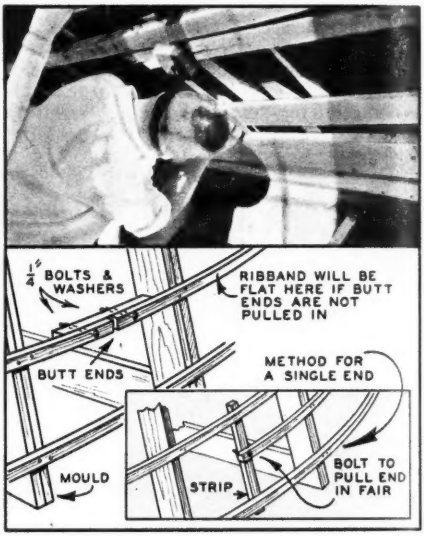
SEAGOIN' TWISTS



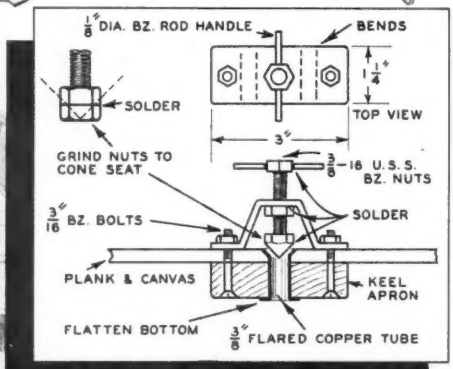
A PROPELLER PULLER that will move even the balkiest wheel and avoid bunging it up with a hammer, can easily be made from two pieces of 1/4 in. steel scrap. After the blades are roughly sawn to shape or cut with a torch, they should be filed smooth and drilled and tapped as detailed in the drawing. You can thread the three steel rods or have a local machine shop do the job. The dimensions given are for a 20-in. diameter wheel with a 1 1/4 in. shaft. However, the size of the puller can be changed to move larger diameter wheels.



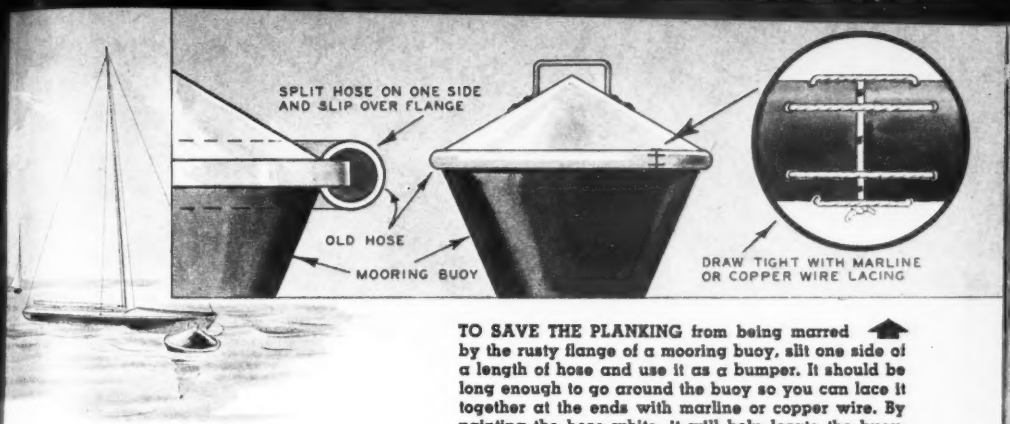
VIBRATION IN METAL BOATS is often caused by a lack of rigidity in the sides. To get rid of the shimmy, tie the two sides together with a metal rod, fastened to the sheer stringers and tightened with a small turnbuckle at the center.



FAIRING RIBBAND ENDS is important in boat construction to avoid having flat spots in the hull lines. The butt ends of two ribbands should be backed up with a heavy strip and bolted to them as shown in the large drawing above. Where there's only a single end, a strip should be placed behind the ribbands above and below it, and any flat spot eliminated by pulling it true with a 1/4 in. bolt. This is illustrated in the upper photo and the small drawing. The ribbands should be made of heavy stock.

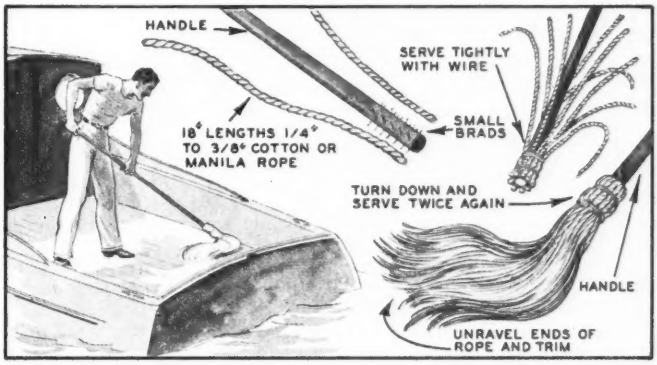


DRAIN VALVE FOR THE DINGHY. If you carry your dink' on davits, you'll appreciate the convenience of this gadget for draining out the rain water that usually collects in the bottom. There's no wooden plug to lose or swell and no session with a hammer trying to get it loose. Instead you'll have a foolproof valve that works with a twist of the wrist. All of the details and dimensions are given in the drawing to the left. The flare at the top of the copper tube can be made with an ordinary plumber's flaring tool. To keep the tube in place while you're flattening out the bottom lip, drive a tight wooden plug down the tube, boring it out later.

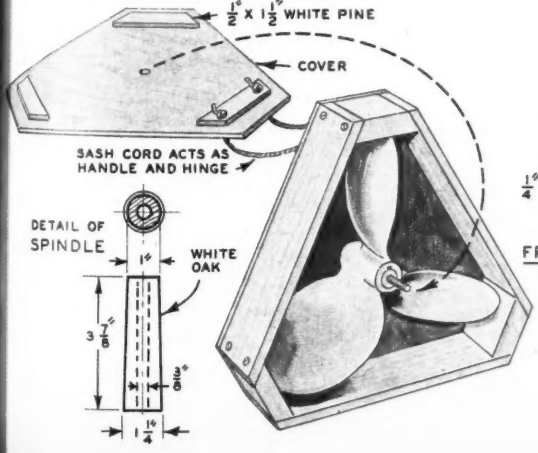


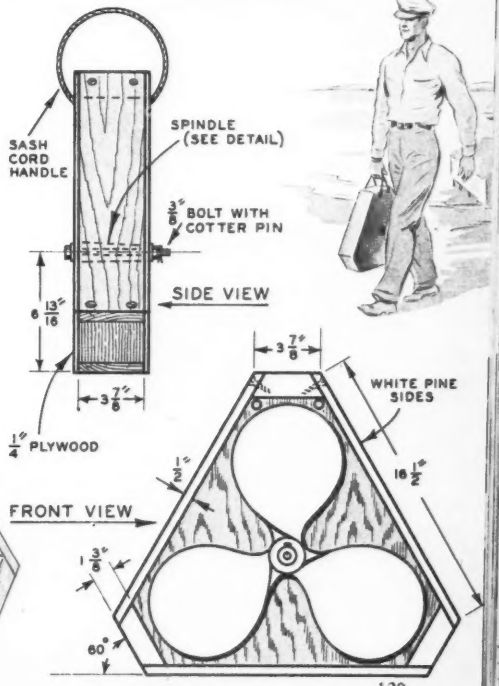
TO SAVE THE PLANKING from being marred by the rusty flange of a mooring buoy, slit one side of a length of hose and use it as a bumper. It should be long enough to go around the buoy so you can lace it together at the ends with marline or copper wire. By painting the hose white, it will help locate the buoy.

A YACHT MOP that will give as much service as the fancy ones from outfitters, can be yours for the making. Simply get an old broom handle and on one end bind 18 in. lengths of cotton line with a serving of copper wire. Then drive small wire brads in the bundle to hold it, turn the ends of the rope down and add a final serving of the wire. Before using the mop, unravel and trim the lines.



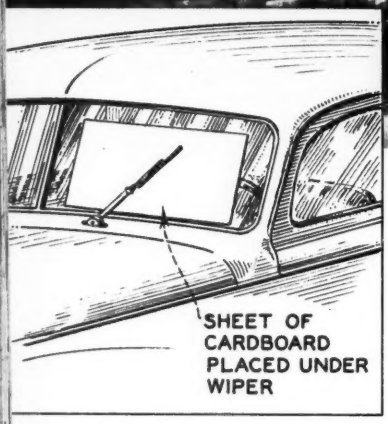
PROTECT YOUR EXTRA PROPELLER (that most wise owners carry) by making a wooden box for it. This also serves as a perfect shipping case for the wheel if it has to be returned for straightening. You can make the box from scraps of plywood and white pine and the dimensions in the drawing below will take most small boat wheels. The spindle should be made of oak to fit the shaft and drilled for a 3/8 in. bolt which supports the propeller and also locks the cover in place. The sash cord that's attached to the lid serves as a hinge and carrying handle for the case. It also keeps the lip from being lost.





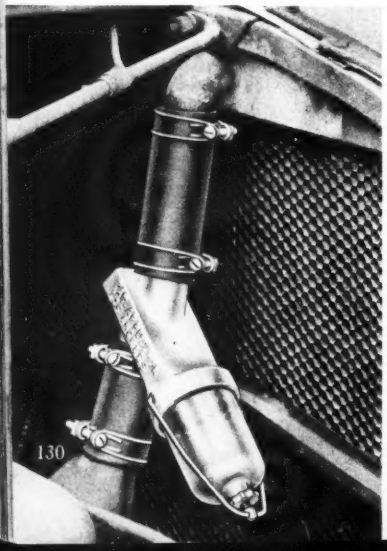
Car Care

Photo by Robert Brightman



WINDSHIELD DEFROSTING. You can prevent your windshield from frosting while parking, by placing piece of heavy cardboard over it.

RADIATOR FILTER is latest gadget for well-groomed car. It fits into upper hose line and traps rust particles and bits of rotted hose.



By placing a log at the far end of the garage and running several stout planks up to it, the front end of the car can be elevated just enough so that it can coast backwards out of the garage on a cold morning. Place the gears in reverse and declutch before releasing the hand brake. When the car has gained a little speed, switch on the ignition, and engage the clutch. Even if the motor doesn't start immediately, this self-cranking will be a great saving on the battery.

Rust Inhibitor does more than hold down the accumulation of scale in the radiator and motor block. It is an emulsifying oil and thus protects the water pump, thermostat, and wire coil inside the lower hose.

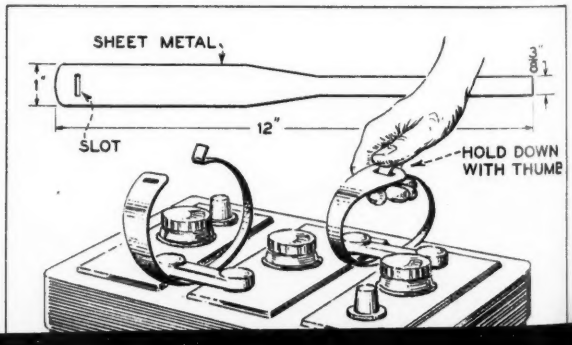
Low Fuel Pressure may be due to a bent fuel pump arm. This shortens the stroke. Bending the arm for increased leverage will increase pressure.

A Noisy Oil Gauge may mean excessive pressure in its own line. Some cars are equipped with a vent in the gauge line which may become clogged.

SAFETY SENSE

Cars may be expensive but they don't have to cost you your life. . . . If you want to live to see 70, don't look for it on the speedometer. . . . Safety outlook depends on everybodys lookout.

BATTERY LIFTER. If your battery lacks handles, you can lift it out by using two strips of metal as shown, as grips.



BEHIND THE WHEEL

With Fred Russell

If you want a personal reply, please include a self-addressed, stamped envelope.

The condensers on my 1942 Plymouth do not last more than 3,000 miles. They either open up or else get weak and will not hold a charge. Andrew B. Wong, Minneapolis, Minn.

Are you sure that the condensers you are using are of the right capacity to match the breaker points? Also check connections in the ignition system. A partial open circuit will cause high voltage.

•

What causes the starter on my 1937 Buick to keep kicking in when the engine is running? David Allen, Camden, N. J.

A broken anti-drift spring in the Bendix drive is probably the cause of your trouble.

•

If my car is overheating shall I add water with the engine running or shall I turn it off? George Presti, Sandston, Va.

The safest thing to do is to add hot water with the engine running.

•

What causes the lights on my 1940 Chevrolet to dim when I stop for a light? James McMahon, Buffalo, N. Y.

A weak battery or poor connections may be the cause. A relay or booster may help.

•

Ever since I bought my 1938 Ford, I haven't been able to keep the battery in it fully charged. Jack C. Johnson, Bedford, Va.

If the generator cut-out is at fault, it will allow the battery to discharge when the car is parked.

•

I have seen a vacuum-controlling device advertised which prevents excessive vacuum and minimizes oil pumping when the engine is used as a brake. Why isn't it incorporated in the average carburetor? W. W. Schnarr, Noranda, Que., Can.

The device you mention does save oil but it also cuts down on the engine's braking effect.

•

How can I get more than 13 mpg on my 1939 DeSoto? It has a new motor, new points, coil, fuel pump, spark plugs and carburetor. John Abiza, Detroit, Mich.

Check the ignition timing. Timing should be advanced far enough so that the engine will ping on acceleration even with premium gasoline.

•

My 1939 Dodge is quite noisy on the road. It seems as though you can hear the individual firing of the piston. Muffler is O.K. Thomas Caruana, Buffalo, N. Y.

Sounds like a loose exhaust manifold. Tighten the bolts and check the fit between the manifold flange and the exhaust pipe.

•

What causes my 1939 Plymouth to overheat? Have checked the timing, thermostat, fan belt, and radiator. Graiber Repair Shop, Coon Rapids, Iowa

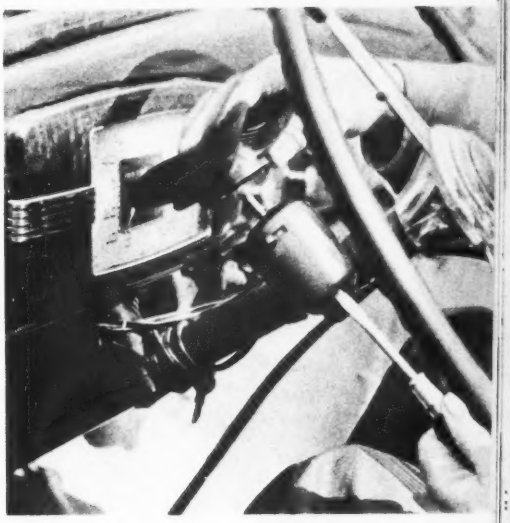
The overheating of your car may be due to a cylinder head gasket leak. Are you sure you have the right gasket? The wrong gasket may block some of the water passages.

•

I have a 1935 Chevrolet which pulls to the right and hangs low on the left. Have had front end aligned twice with little success. David M. Berg, Waterloo, Iowa.

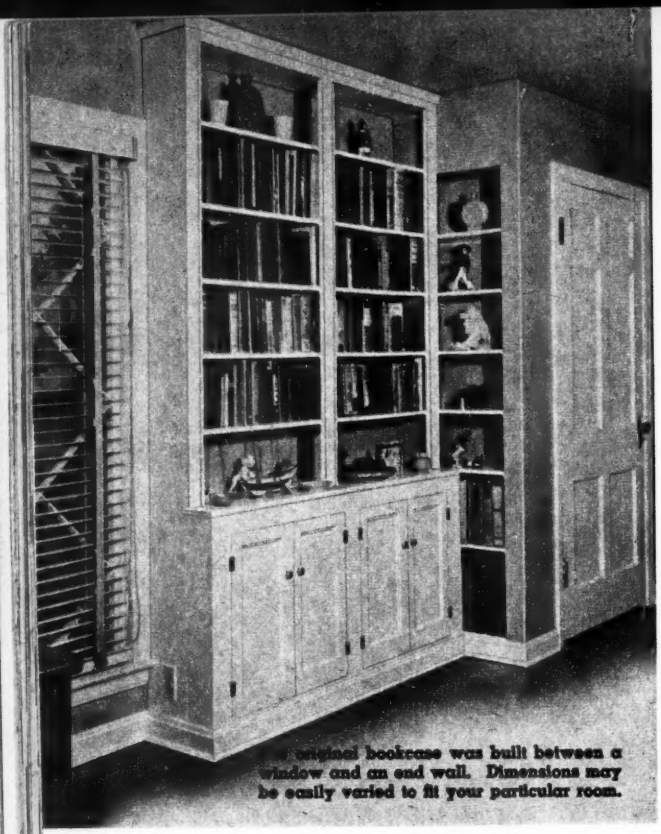
You won't get much relief from your steering condition until you replace the knee action units. Repairs are generally not satisfactory as the coils are apt to be weak due to wear.

NITE LITE for flats and roadside emergencies plugs into cigar lighter socket. Has 14-ft. cord and handy hook. Made by Barton Eng. Co.



THE DEFROSTING FAN will work better if its bearing isn't too tight. This is adjusted by turning the screw at the bottom of the housing.

TAIL LAMP FAILURE (below) is often due to a poor ground. Make sure that the bolts holding the sockets to the body are clean and tight.



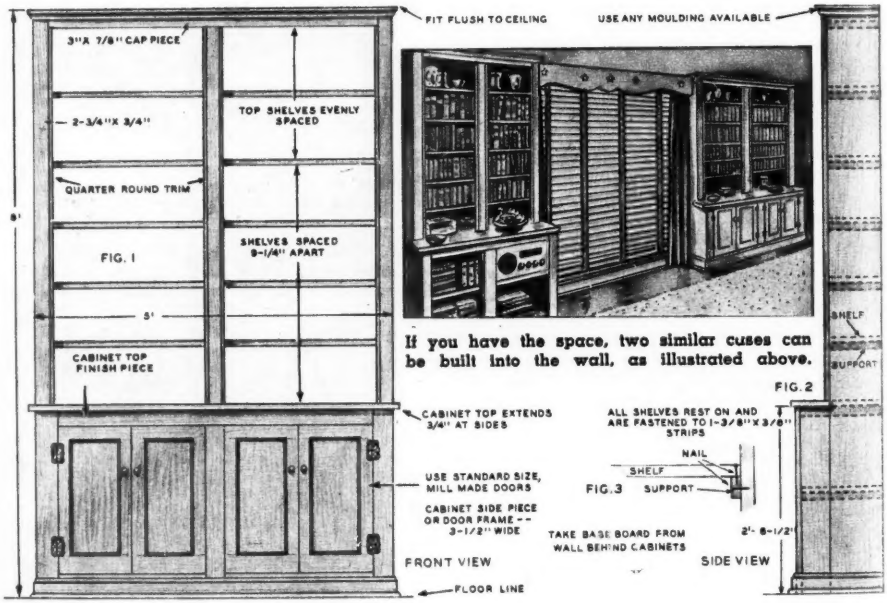
The original bookcase was built between a window and an end wall. Dimensions may be easily varied to fit your particular room.

Built-in Bookcases

You need not be a cabinet maker to build this 300 plus capacity case. Just follow these directions.

BY JAMES D. POWELL

UNLESS you can conveniently store and arrange your books so you know what you have and where it is, you may just as well keep your collection in a closet. While the average individual has his ever-expanding collection in three or four small bookcases, which admittedly serve the purpose, any real book lover should welcome the chance to keep his collection in one place. And here is that opportunity, in the form of a well designed wall-type case that will fit in with the furnishings of any living room. It's practical, eco-



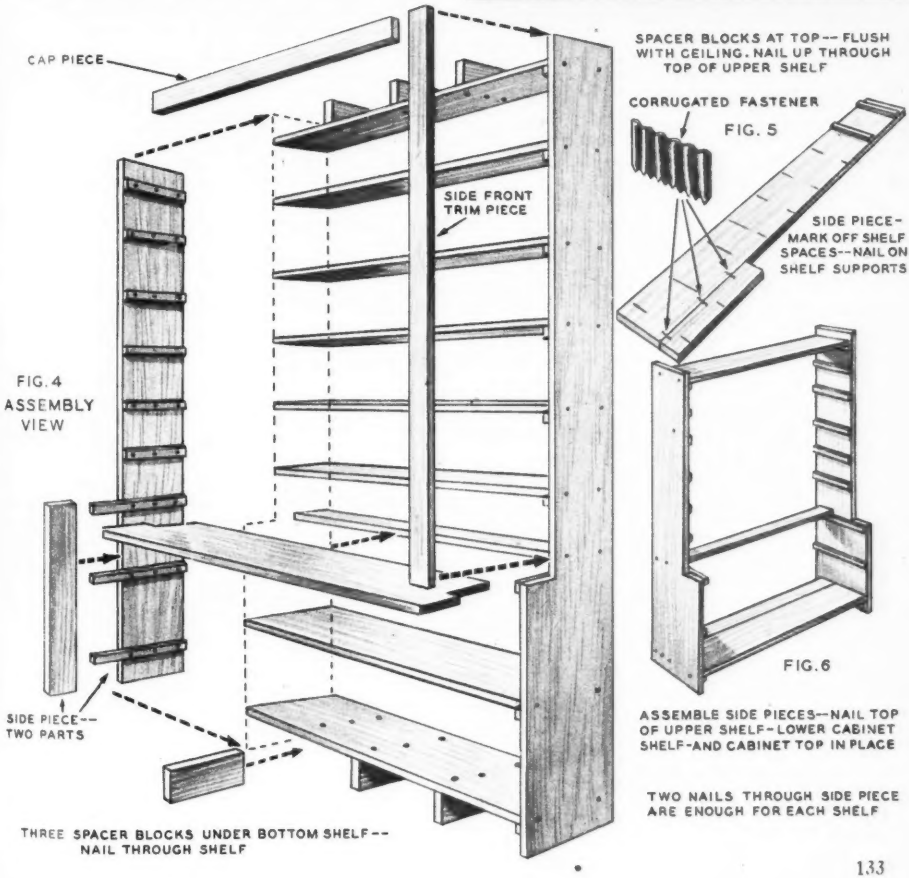
If you have the space, two similar cases can be built into the wall, as illustrated above.

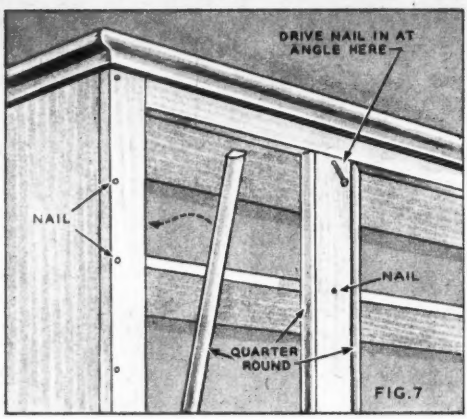
nomical and certainly professional-looking. Why not plan a similar unit for your home?

The first step prior to actual construction is to prepare a rough scale layout of the cases as they will appear in your room. A 1 inch equals 1 foot scale will greatly simplify matters. Roughly sketch in the width of the wall space available for the cases and also lay out the height of the lower cabinets and shelf spacing. This is an important step, as most rooms vary in height. The original bookcases were built to fit a room having an 8 ft. ceiling and the wall space permitted the width and shelf measurements shown in Fig. 1 and 2. Naturally, you may be required to change these measurements to fit your own room, but try to keep to the same general proportions.

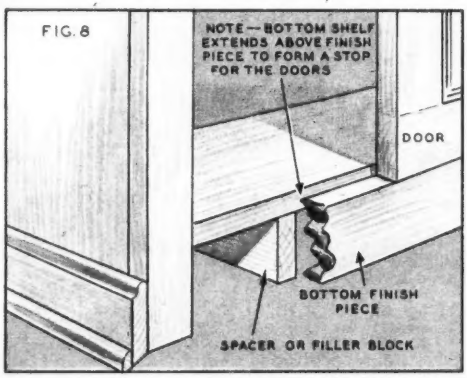
All wood used in construction should be well dried, 1 in. thick interior pine dressed down to about ¾ in. thick. The actual construction is a simple job because dado joints have been eliminated entirely; finishing nails are used for assembly through-

The lower cabinets are ideal for larger books, folders, catalogs or anything else.

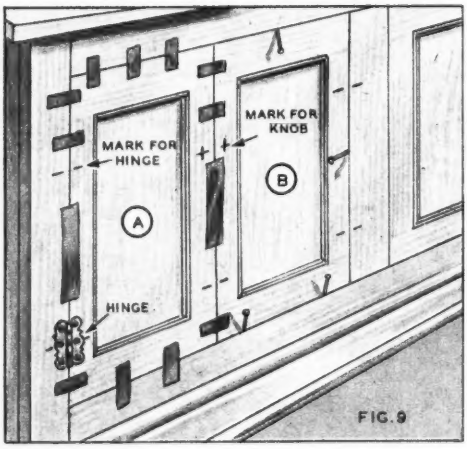




After the sides are mounted and the shelves secure, the 3 in. wide cap and center pieces are nailed in place. The quarter round moulding is then attached.



Above: Spacer or filler blocks, 2½ in. high, are mounted under the bottom shelf which extends ½ in. above the finish piece. Below: A and B illustrate two accepted methods of holding the doors in place while marking the position of the hinges and cabinet locks.



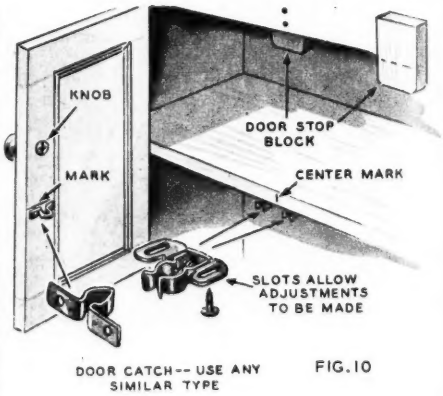
out. The two side pieces are made first. Each consists of two pieces, one 8 in. wide board to reach from the floor to the ceiling and a 4 in. wide piece, reaching from the floor to the cabinet top. Of course, the entire side can be made from a single piece, but this is not too economical.

After the pieces are cut to size, join them with corrugated metal fasteners as shown in Fig. 5. Mark off all shelf spaces and nail the shelf supports in place, using 1 in. finishing nails. When both sides are assembled, nail the shelves in place with 2 or 2½ in. brads, in the manner illustrated in Fig. 6. Note that the cabinet top and lower shelf are made in two pieces.

If your bookcase is to go against an end wall, the wall side piece can be anchored firmly in place before assembling the other side. The shelves are then added. Cut all upper shelves to size from 8 in. wide stock and nail each firmly in place. Nail through the sides and also down into shelf supports as shown in Fig. 3. Follow by anchoring the lower cabinet shelves in place and then cut the cabinet top, allowing the ¾ in. indicated overhang. The three spacer or filler blocks between the bottom shelf and the floor prevent the former from sagging. With the shelves in place, add the front trim. Nail the top cap piece between the side trim pieces, attach the center trim piece and then add the quarter round trim. Cut it to fit tightly against the cap piece.

While working at the top it's a good idea to nail the ceiling moulding around the corners. Use any moulding obtainable, but try to [*Continued on page* 154]

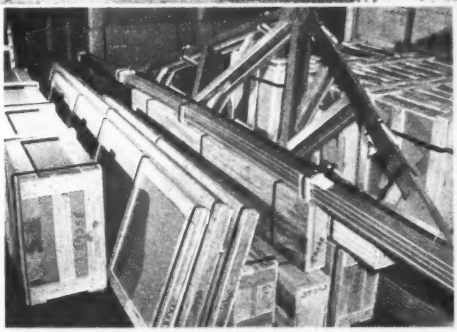
Each door is fitted with a friction catch. Your local hardware store will recommend a suitable unit.



Aluminum GARAGE

Even if you can't lift a cement block or drive a nail straight, you still can put a roof over your car with a wrench and screwdriver.

ALUMINUM—the wonder metal of the world—has rolled into so many industries during the past decade no one knows just where the use of this metal will stop. Aluminum boats are quite common; window sash and doors formed from this metal are also becoming increasingly popular but one of the most recent applications is a 12x20 ft. garage, in kit form no less. Prefabricated by the Reynolds Metals Company of Louisville, Kentucky, each piece is cut to shape, drilled, then numbered and crated. Working drawings show the exact position and erection sequence of all parts, which can easily be assembled by the average craftsman after the foundation is poured. The result is a rust, rot, fireproof and maintenance-free structure. •



Above: This could be your garage in "kit" form. The lightweight parts greatly ease assembly operations.

Bolts cast in the concrete curb fasten the bottom plate to the 12 x 20 ft. foundation. Below: With the framework aligned, aluminum clapboards are then added.

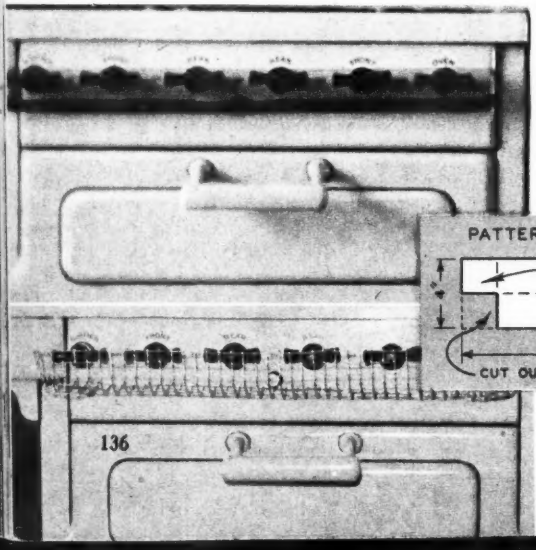
Clapboards interlock, forming a smooth, waterproof joint. The finished garage need not be painted.

Home and Shop Kinks

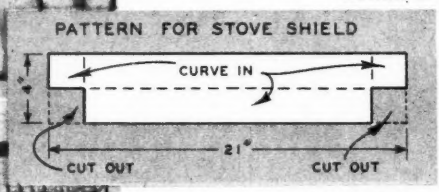
A Vertical Roller such as shown in the inset, will be of great help if you use a hose often around the house. Drive the inner pipe about 12 in. into the ground.

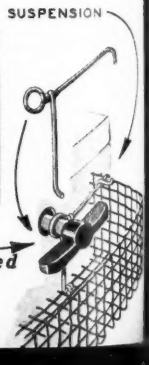
A Radio Tube which has loosened from its base can be repaired by means of some tape. Wrap it to overlap the base and the glass envelope. See the photo above.

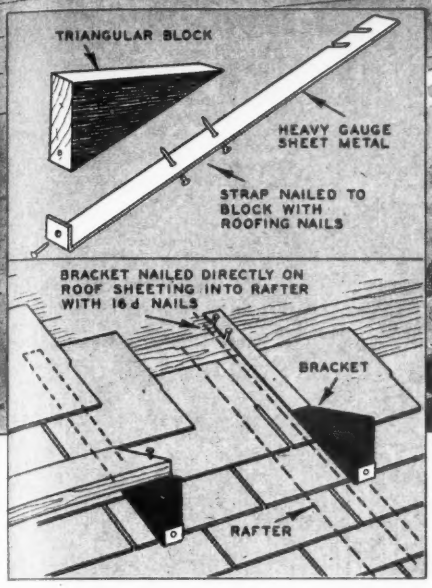
A Worn Doorknob setscrew which no longer grips the shaft can be given a new lease on life by flattening it slightly. Place the screw on a steel block and tap it lightly, just enough to burr the threads slightly.

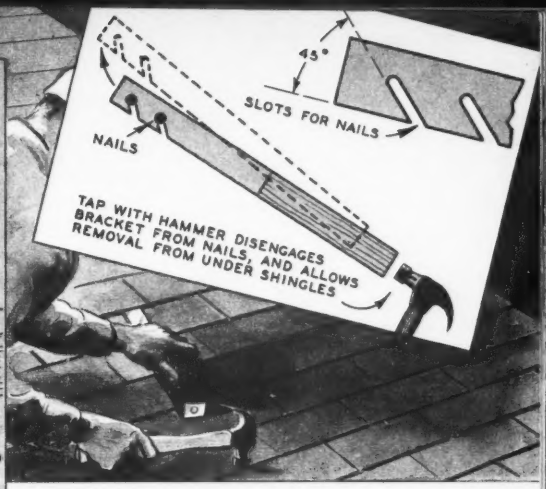


This Gas Stove Handle Guard will prevent accidental turning of the handles and will also stop young inquisitive fingers from possibly causing a tragedy. It is made of ½ in. hardware cloth. Allow ample room at bottom for turning.

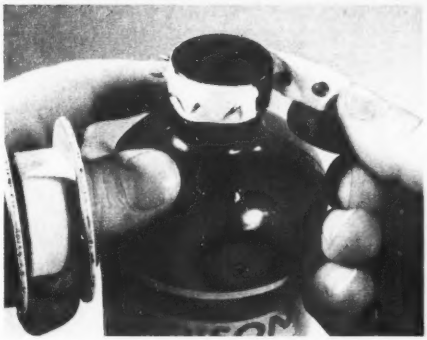




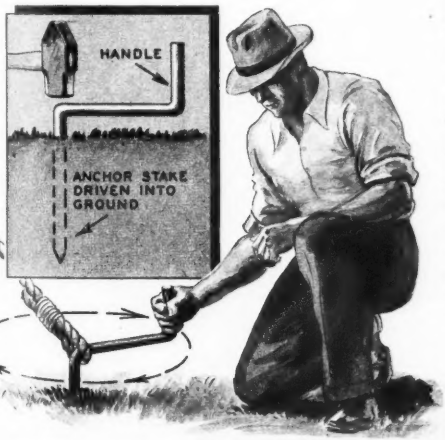




Roof Shingling. A 1½ in. sheet metal strap with two slots at the top and a triangular block of wood at the bottom will come in very handy for roof work. A 16-penny nail should be driven into each slot to support the bracket on the roof. Drive the nail into the rafter or bend it on the underside if it engages the sheathing only. Place a plank across the triangular blocks.



Poison. The cap of a bottle which contains poison will give would-be users a positive warning if it is covered with a strip of adhesive tape through which a row of carpet tacks have been pushed.

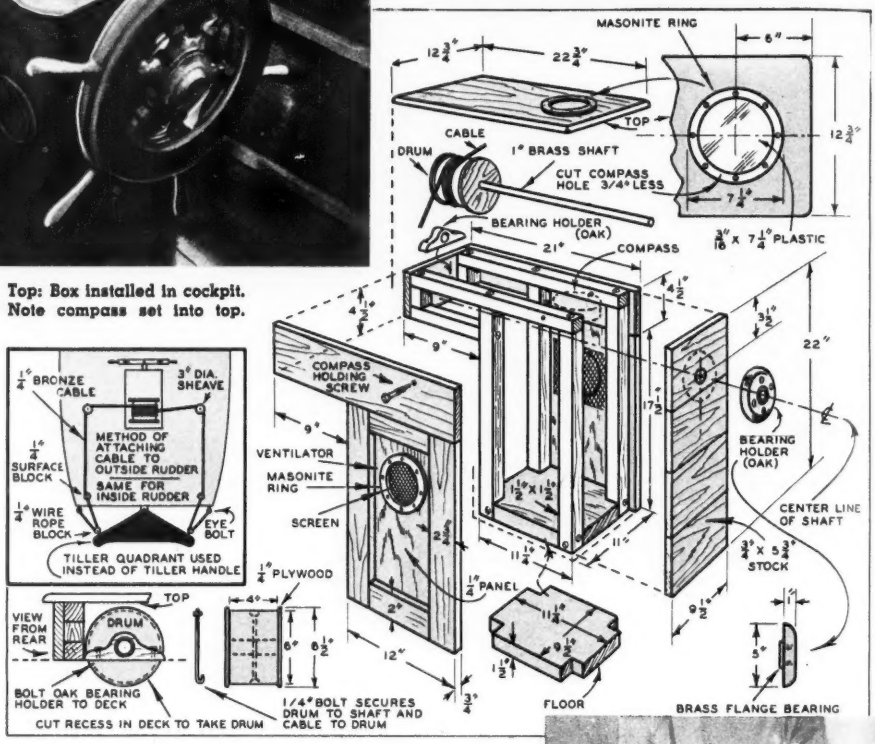


Stake Loosening. Steel stakes used to anchor power machinery in the open should be driven firmly into the ground. However, when the time comes for removing them, they can cause quite a tussle. By offsetting them, they can be rotated for easy removal.

Mailbox Makeup. When dressing up your home and grounds, do not forget the lowly mailbox. Generally, it sticks out like a sore thumb. Covered wagon and log cabins are just two ideas.

sailboat WHEELBOX

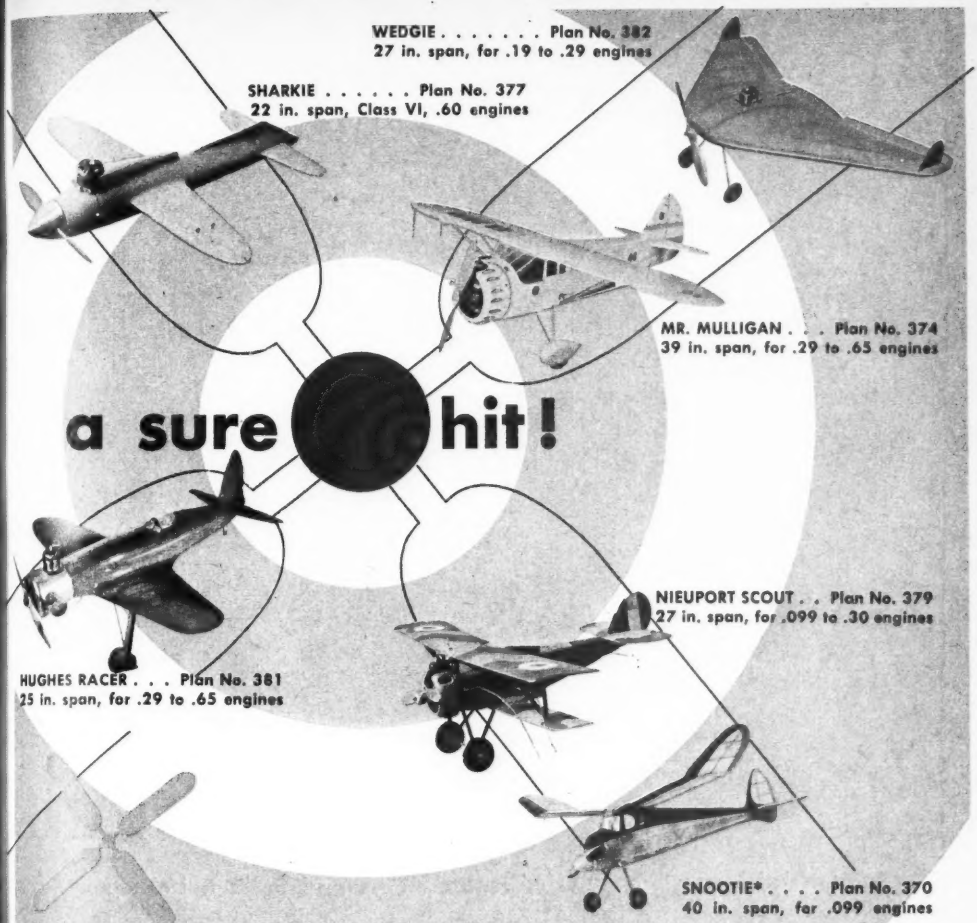
Top: Box installed in cockpit. Note compass set into top.



HERE'S a handsome wheelbox that can be installed on any sailboat with a fair-sized cockpit and an inboard or outboard-mounted rudder. The outside panels of the box are best made of mahogany with the framing of oak. Bronze fastenings and hardware should be used to resist corrosion and also because of their non-magnetic properties. The box may be assembled in the shop and then brought aboard the boat and bolted to the cockpit floor.

Before starting the construction, the height of the deck above the cockpit floor where the box is to be installed should be measured and the dimensions of the housing altered so it will fit the space exactly. The drawing will furnish all of the dimensions and details of the assembly. All joints in the framing should be glued and fastened with 3 in. No. 12 screws. The boards in the top and front panels should have tongue and groove joints, and are fastened to the framing with glue and 1½ in. No. 10 screws. The compass is mounted by means of 3 in. No. 12 screws through the box sides and into the gimbals. The steering wheel may be purchased at a marine supply store or made in the shop. •

Top removed to show compass, drum and cable. Box should be finished with varnish.



That's what thousands of model airplane fans all over the country are saying about the MI full size gas model plans. They're accurate, complete and what's more—they're TESTED! Yes, every model was built and throughly test flown before the design was published in MECHANIX ILLUSTRATED. If you've never built a model airplane or are strictly a "kit builder", make your next job from a MI plan. Visit your local hobby shop and examine his assortment or else send 50 cents for each plan desired to: MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Your plans will be mailed the same day the order is received.

P-47 THUNDERBOLT . Plan No. 375
20 in. span, for .099 to .29 engines

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When ordering two or more of the above plans, we will give you **ABSOLUTELY FREE** plans to build Pylon Buster, a 7 foot class C free-flight contest winner. Why not add this unusual design to your plan collection?

*Snootie is a free-flight Class A model. Other models shown above are control-line.

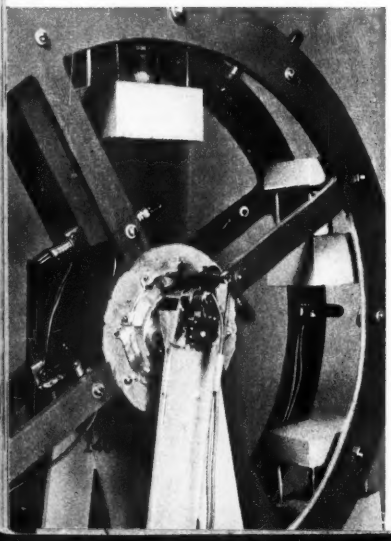
TOY FERRIS WHEEL

BY ROBERT GRAHAM

Photos by the author

After riding a Ferris wheel, what youngster wouldn't want to have one for his very own?

Cars are made of 2x3-in. balsa wood with "men" fashioned out of clothespins. Note lamps.



THE appeal of a Ferris wheel has stood the test of time, as they still appear at carnivals and amusement parks despite all the new rides like "Rocket Planes," "Cyclones," "Tornadoes," and other wind-producing and marrow-chilling amusement (?) devices. This model, with colored lights and music which plays as it slowly revolves, will make a welcome gift for a child.

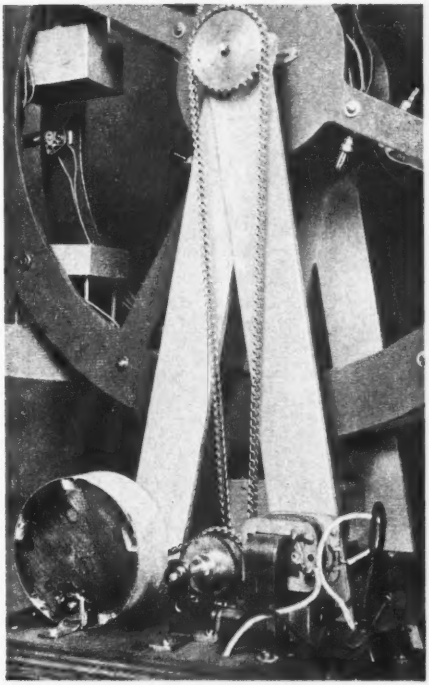
It is made from plywood and balsa and is driven by a 6-volt AC motor. The colored bulbs obtain current by brushes on one side of the wheel. Worm gears, sprockets and chain are stock numbers from the Boston Gear Co. (North Quincy, Mass.)

First lay out the two sides of the wheel on ¼-in. plywood. Then cut out the wheels with a coping saw. Clamp the two wheels together and drill a $\frac{3}{16}$-in. hole in the center. Then lay out and drill the same size holes for the pivot rods for the six cars.

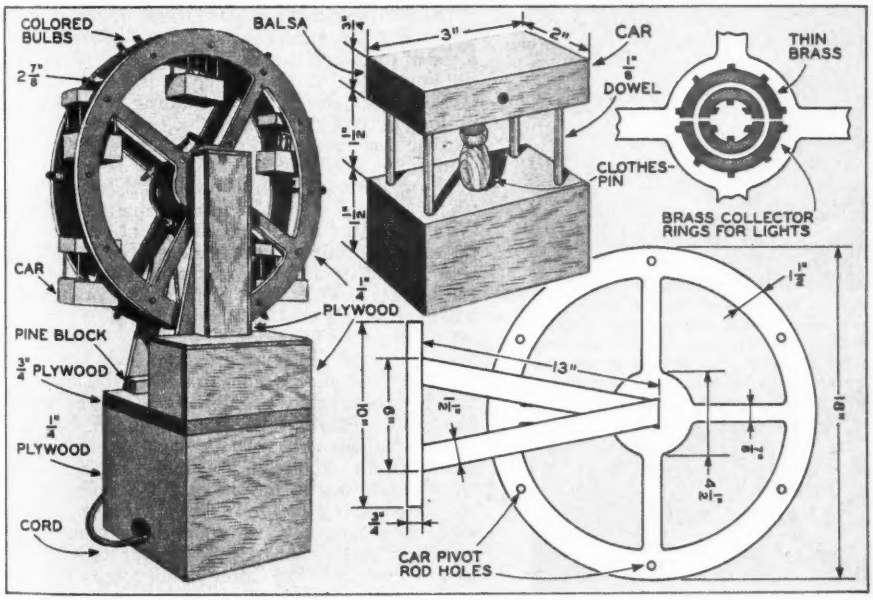
The base is 10x9 in. and is ¾ in. thick. Next, cut the

¼-in. plywood upright pieces. These are lapped over at the top. The bottoms are spread 6 in. apart and the lapped ends screwed together. Square the tops and bottoms and drill the holes for the main shaft, ⅜ in. from the lapped end. Cut the four brace blocks for the bottom of the supports. Screw the uprights to these, keeping the bottoms flush with the blocks. Now screw down the blocks to the base.

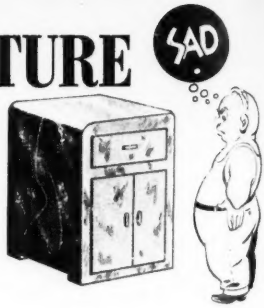
In the center of the bottom halves of the cars, drill holes about ½ in. deep to fit the bottoms of the clothespin "men." Using model airplane cement, the bottom halves of the cars, drill holes about ½ in. deep to fit the bottoms of the clothespins. Using model airplane cement, assemble the cars, spacing the tops and bottoms 1½ in. apart. When dry, drill the pivot holes through the center of the car side tops about ½ in. from the top. Use a $\frac{7}{32}$-in. drill so the cars pivot freely on the $\frac{3}{16}$-in. rods. Make these six rods from bronze welding rod or drill rod. They are 3¾ in. long and the ends are threaded with a 10x32 die. Fasten the rods to one wheel, using a nut and a flat washer on each side of the wheel. Slip about four flat washers on each rod for clearance and put the cars on. Put four washers on next to the cars and then attach the other side of wheel. Space the wheels 2⅞ in. apart. Cut the main shaft 6¼ in. long. To fasten the wheel to main shaft, take a setscrew collar and solder a strip of thin brass [*Continued on page* 158]



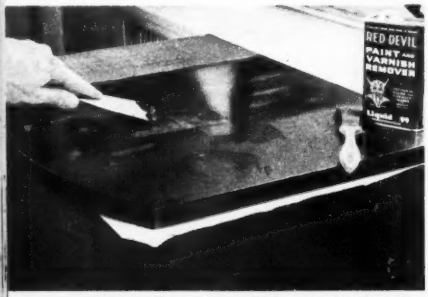
All sockets are wired in parallel with current supplied by brass collectors. The ladder chain passing over the gears should have a little slack.



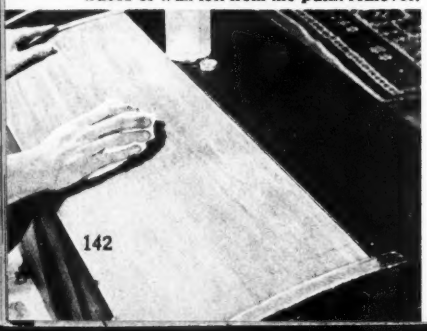
How To Refinish FURNITURE



A 50-year-old cellaret before refinishing. The surface was dull, chipped, uneven and cracked. The finish down to the bare wood required removing.



Above: Scraping off the old finish after a coat of varnish remover was applied. Below: After the bare wood is reached, wipe the area with benzine to dissolve traces of wax left from the paint remover.



BY ROLAND CUEVA

PUTTING a bright new professional-looking finish on a dingy, time-worn piece of old furniture is not the frightening task a great many men seem to think. It requires no "trade secrets" nor special artisan talents; anyone possessing some patience, the ability to follow simple instructions and enough strength to do a bit of vigorous scraping and rubbing can produce a lasting, mirror-like finish.

As for durability, you can way surpass the average finish applied today to new medium-priced furniture, which usually begins to deteriorate quickly because of the widespread use of cheap synthetic lacquers and quick mass production methods. The only way to get a lustrous, long-wearing finish is by applying several coats of top quality surfacer, rubbing carefully between coats and after the final coat, the method used by craftsmen of years past and by present day manufacturers of custom furniture.

Take a look around the house; there is undoubtedly an old table, cabinet, bookcase or piece of furniture that needs refinishing. Chances are you picked it out long ago but have delayed tackling the job for fear of lousing it up. Delay no longer; you can make it look as your grandmother first saw it and get a great deal of satisfaction from doing it.

There are three main types of satisfactory finish in general use: Varnish, lacquer and wax. Wax, of course, may be applied in any case over the first two finishes as a preservative, but it can also substitute for them as final coats over a shellac or lacquer base. The plain wax finish, however, needs continual rebuilding.

Color or tone of the finish depends not only on your own preference but also on the kind of wood being worked and its condition after the old surface has been removed. New wood can be given almost any desired tone, from bleached "harvest wheat" mahogany to very dark walnut. But when renewing an old finish, you have to work over what's underneath, and the original stain may be the determining factor in your decision. If the piece was originally, say, Sheraton mahogany, you had best refinish it in similar or slightly lighter color. On the other hand, maple is generally given a light treatment in the first place.

After the benzine treatment, mix a little elbow grease and 3-0 sandpaper over a block. Finish with 5-0 paper.

Above: Rub the surface again with benzine and proceed to apply the stain. Allow stain to set for 15 minutes, then rub off. Follow with a coat of shellac.

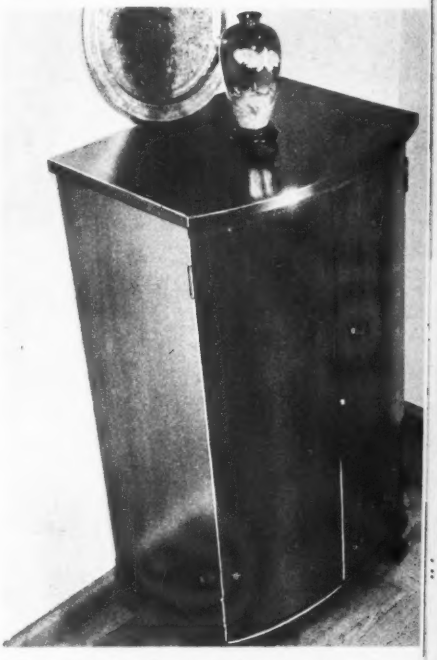
so you can either keep it that way, bleach it out or darken it. The same applies to oak.

Let's take a typical example of a refinishing job and follow it right through. In the photos the subject is a 50-year-old solid mahogany cellaret, whose fine dark red polished surface has long since become dull, opaque and traced with the criss-crossing lines that indicate crystalization of the varnish. Before starting the job we have to get materials and tools, whose cost will be nominal—four or five dollars at most. Here's what is needed: 1 scraper, 2- or 3-inch (putty knife type, *not a hook scraper*); 1 pint paint remover; ½ pint white shellac; ½ pint oil stain in suitable shade; 1 pint short-oil rubbing varnish, top grade; 1 can of benzine; denatured alcohol; 1 can of hard wax; 1 dozen sheets No. 3-0 sandpaper; 1 dozen sheets No. 5-0 sandpaper (or finer); fine powdered pumice, steel wool, No. 00; 4 good brushes, 1½ inch; soft clean rags. One thing is important. Buy the best, especially where shellac, stain and varnish are concerned. DuPont, Sherwin Williams, Devoe and International produce superior products.

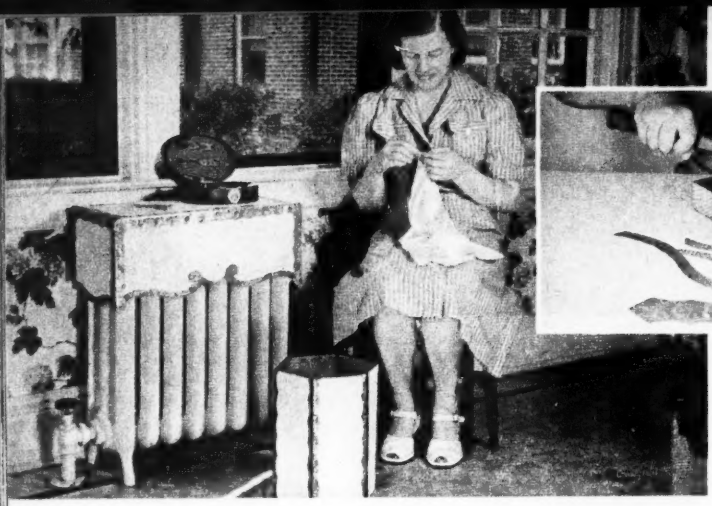
The first step is to remove every vestige of the old finish right down to the bare wood, *but not through the original stain.*

Apply an even coat of the remover, allow to stand for about ten minutes and then scrape carefully with the putty knife. If you're lucky, the old finish will come off clean in a gummy mass; more likely only one layer will loosen with the first application of remover. If so, repeat the process twice, or even three times until the wood is fully exposed. Don't ask how to tell when this state is reached—you'll just know. If the piece has scrolls or figurings use a thin knife blade to scrape these parts. Next, wipe the whole business with a clean rag soaked in benzine, to pick up the wax residue contained in almost all paint removers.

So far it's been little effort, but now you've got to pour on the elbow grease. Sand the piece (as shown in photos of the cellaret), first with 3-0 and then 5-0 paper, until the wood feels smooth as satin and the color is even all over. Don't be discouraged by the appearance of light and dark areas in the base [*Continued on page* 158]



The original cellaret displays its new sparkling finish. Technique contained in text is applicable to all furniture.



The metal should be peened on a block of wood. Aluminum, copper or brass can be used as base material.

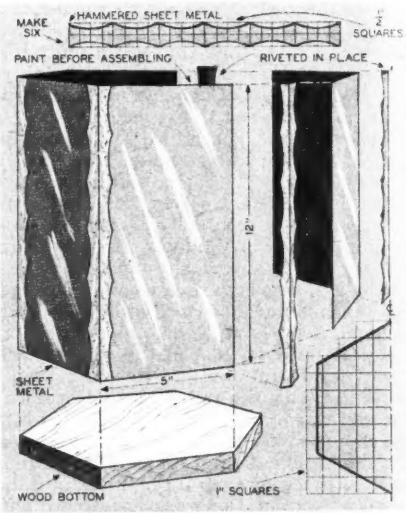
Radiator Cover and Matching Wastebasket

A SHEET metal radiator cover and a wastebasket made to match of the same material, if tastefully designed and neatly constructed, can be as decorative as they are useful. They can be made of almost any kind of sheet metal.

The radiator cover illustrated at the top of the page is made of five pieces of galvanized sheet iron. The dimensions are for a radiator of eight sections. Any change of dimensions to accommodate a larger or a smaller radiator will require modification of the curves.

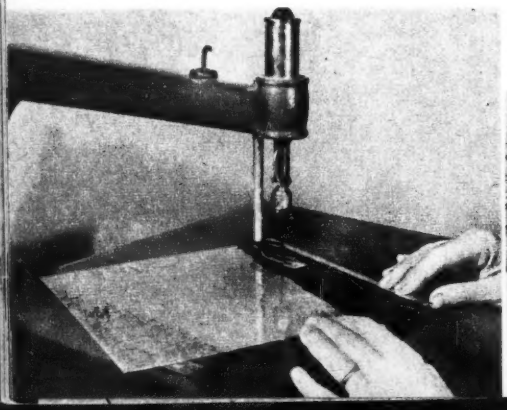
If a jig saw is not available, the work can be easily done by hand using a tinsnip, a coping saw and a file.

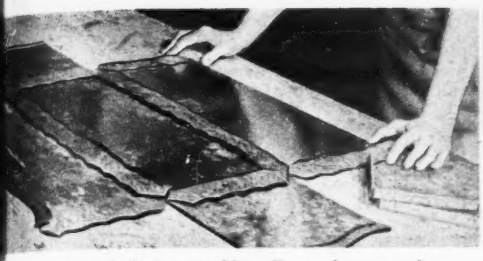
It is important to mark the work before starting to cut. Pencil lines are difficult to see and have a tendency to rub off, while



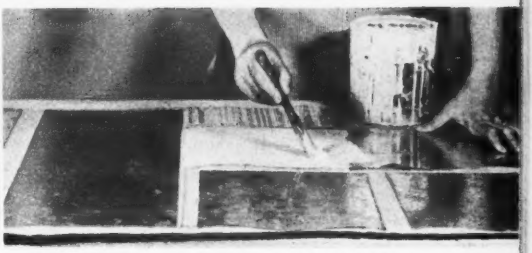
Apply India ink and scribe necessary lines with awl. This is better than using pencil.

Cut the metal with a jig saw or a coping saw. On jig saw, use a blade having 32 teeth per in.





Cover before assembly. If you have used unmatched pieces of metal it is best to paint unit.



Galvanized metal should be swabbed with hydrochloric acid and rinsed in water before painting.

lines scribed with an awl are also hard to make out on bright metal. An excellent way to overcome these difficulties is to apply India ink with a brush and scribe through it with an awl when the ink is dry.

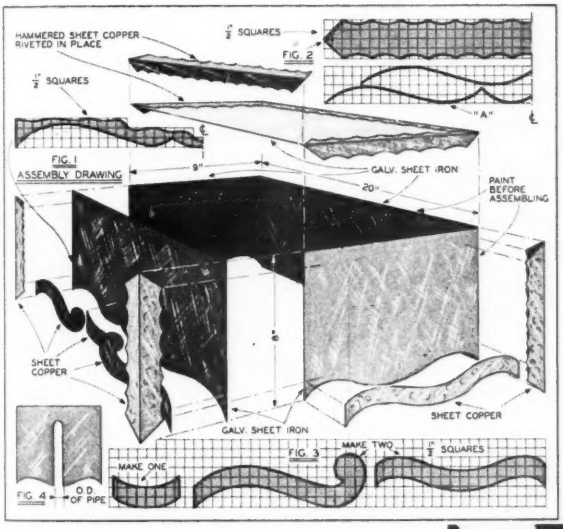
The five panels of the radiator cover are secured one to each other by strips of hammered sheet copper riveted in place. The edges of the strips are cut to a decorative curve. Eight strips are needed, four for the cover's horizontal edges and four for the vertical edges. The length of the strips is governed by the dimensions of the cover.

In addition to these connecting strips, make ornamental curved strips. These are riveted to the curved edges of three of the vertical panels. The fourth vertical panel needs no ornamentation as it goes between the radiator and the wall.

When hammering the copper strips (or whatever metal you use) place them on a block of soft wood and use a ball peen hammer.

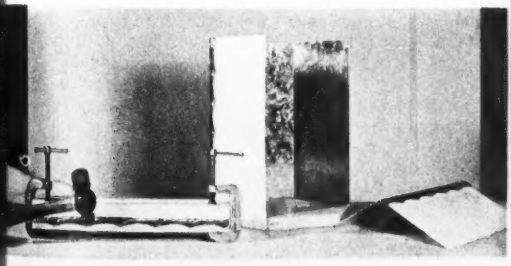
With the panels and the connecting strips cut, you are now ready to paint the panels, assuming that you have decided to do so, and rivet the parts together. Flat paint will withstand heat better than paint that dries with a glossy finish.

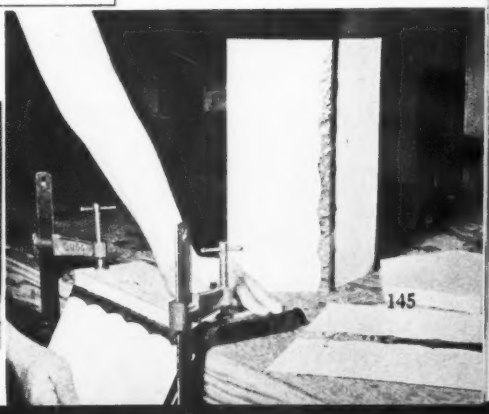
After the parts have been riveted together, turn the [*Continued on page* 154]

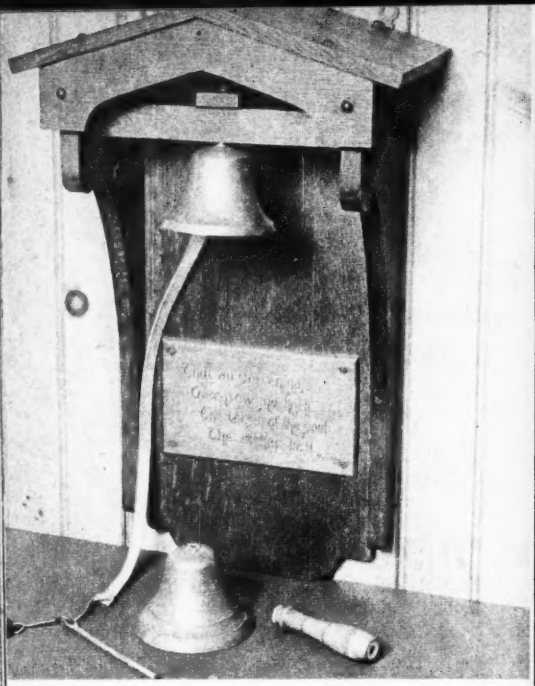


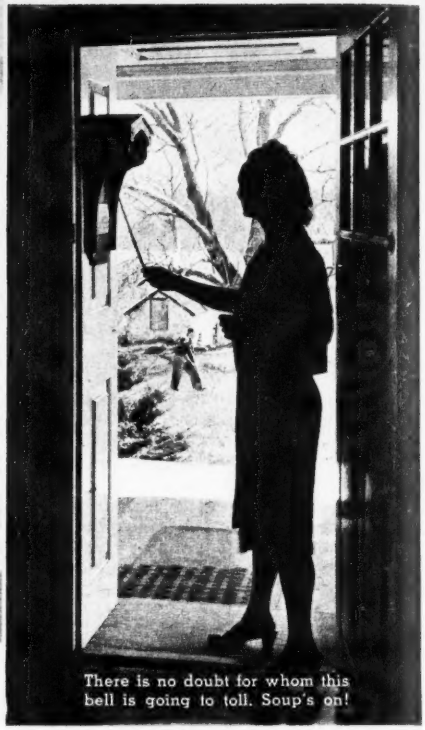
While a bevel gauge is handy it is not absolutely necessary in order to get the 120° bend required.

Using a brake to bend the metal sides of the wastebasket. Sides should be bent to 120° angle.









There is no doubt for whom this bell is going to toll. Soup's on!

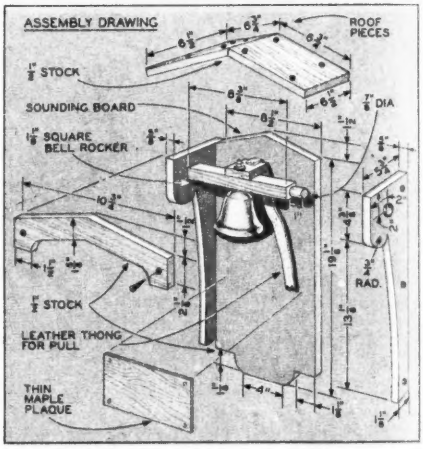
De Luxe Dinner Bell

MOST characters are always on hand for meals, but there are others who are never within earshot when the victuals are piping hot. This old-fashioned dinner bell with its hooded sounding-board will call 'em from near and far with a few gentle taps or with an impatient brazen clatter.

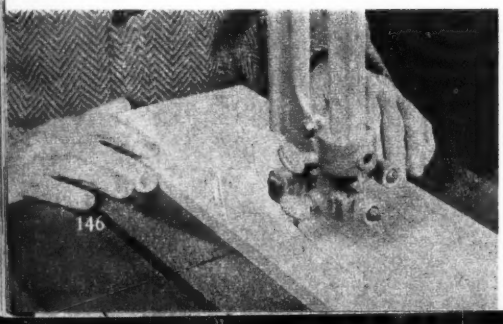
The required bell can be obtained at a hardware store or a ship chandler's. The one illustrated here is 3 inches high.

The parts for the housing are prepared to the dimensions given in the drawings and assembled with flathead screws countersunk below the surface of the wood. Plug the holes with dowels, rounded on the ends, and allow them to project slightly above the surface. Assemble the bell, rocker and arm as shown.

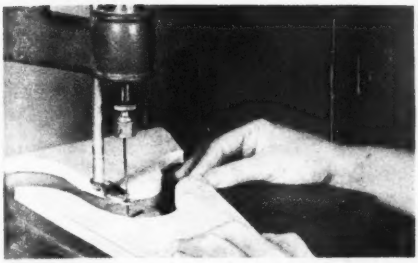
Bell was given an antique finish and decorated with a maple plaque on which was carved an appropriate sentiment. •



The sides are laid out and cut from one piece of lumber. Well-seasoned white oak is good



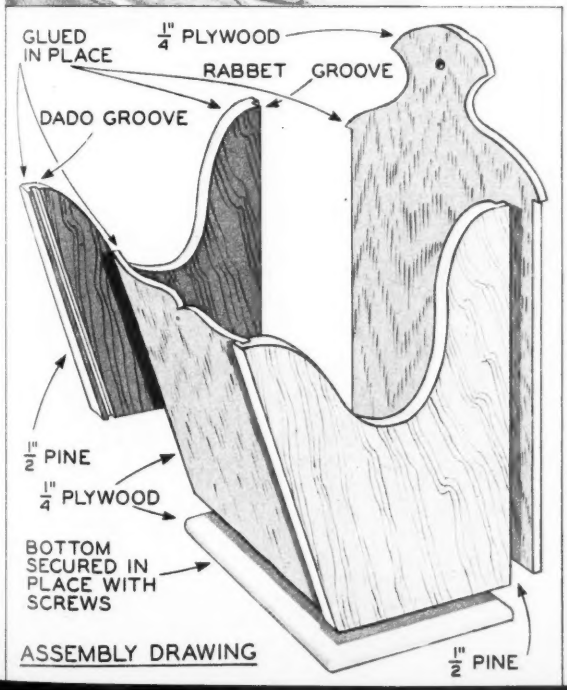
Indoor Mail Box



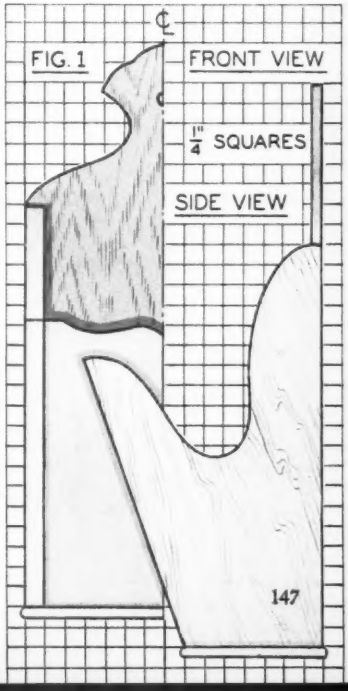
The sides are cut from ½ in. thick white pine and the edges grooved for the front and back piece. Below: After the surface has been sanded thoroughly brush glue in the grooves and assemble.

IF YOU always find your daily mail neatly resting on the living room table or desk after a long day at the office or shop then skip this page. But if your mail is scattered all over the house then why not spend an evening in your shop making this useful indoor mail box?

Letters go into the box while rolled magazines and newspapers rest on the U-shaped pine sides. Start the project by ruling off ¼ in. squares on a piece of wrapping paper and then, with the aid of Fig. 1, mark off the outlines for the front, back and side pieces. Next, trace the outlines on the prescribed stock and carefully cut the curved portion of each section. Groove the sides and then assemble. Varnish or paint to suit.—*Bertram Brownold.*



ASSEMBLY DRAWING



① 1st Prize .....The Kodacat $10.00 goes to Arthur L. Schoeni of Arlington, Va., for capturing his cat in a photo blotter roll.

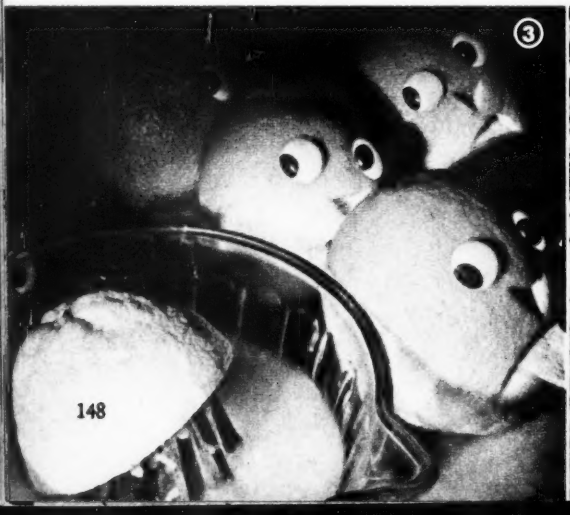
② $5.00 Award ....."That Ain't Hay" Taken by Lou Gardner, Detroit, Mich. Rolleiflex camera, Super XX film, 1/100th, f-16, K2 filter.

③ $5.00 Award ....Watchful Waiting A kitchen tableau by Rudy Boger of Richmond Hill, N. Y. Taken with a Speed Graphic and spotlight.

④ $5.00 Award .....Maple Lane F. J. Heller of Bartlesville, Okla., captured the nostalgic feeling of summertime with a 4x5 Graphic.

photo contest

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Address all entries to: Monthly Photo Contest Editor, MECHANIX ILLUSTRATED, 67 W. 44th Street, New York 18, N. Y.



The best part of a good editing job is good titles. Here's how to make them in 75 minutes.

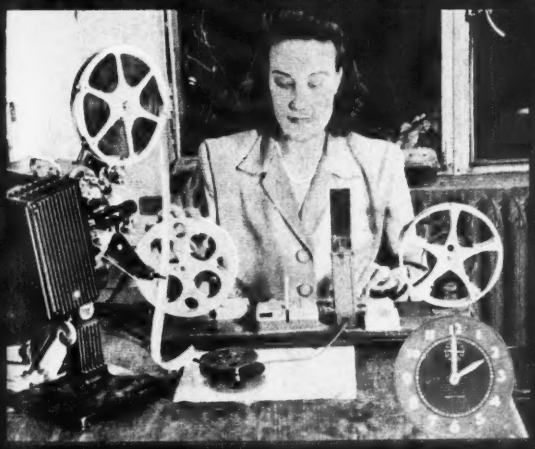
MOVIE TITLES... in a hurry

First step. Shoot titles on low cost positive film. After each title, unscrew lens and mark end of title directly on film. Use lead pencil.

Second step. Remove film from camera and cut into convenient lengths at nearest pencil mark. Develop in a tray using a contrasty developer.

Third step. After fixing, washing and forced drying, the titles are ready to be spliced into your reel of film. A film editor is of great help.

Last step. Ready for the screen. Inasmuch as the film has not been "reversed," black letters on white background will appear white on black.



ELECTRONIC WATER SOFTENER

This water purifier, designed for alternating current, literally shakes hardness and impurities from tap water.

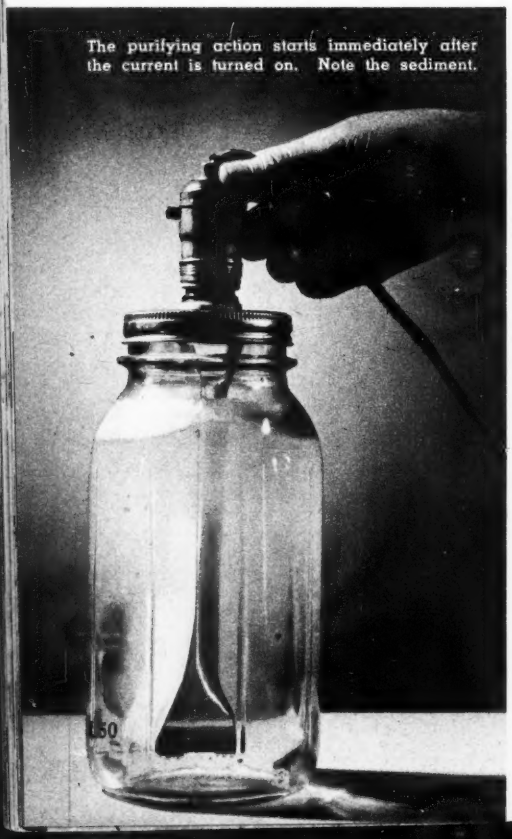
BY KEN MURRAY

WITH this Electronic Water Softener you can actually *watch* hardness and impurities precipitate out of tap water and settle in a thick cloud at the bottom of the glass container. Then all you have to do is pour or siphon off the sparkling clear liquid, and run the gooey, discolored settlings down the drain. The harder the tap water in your darkroom is, the more you will appreciate this quick, simple method. Soft water in your darkroom assures you of scum-free negatives as well as clear developing solutions.

A Mason jar with a Kerr-type screw lid (but not the removable sealing disc) is used. The 1- or 2-qt. size may be used by merely adjusting the length of the activator to suit, but the larger size is recommended. The activator consists of two aluminum strips with the ends bent and drilled for bolting to the bottom and terminal insulators.

Use $3\frac{3}{16}$ in. sheet Bakelite from an old radio panel as an insulator.

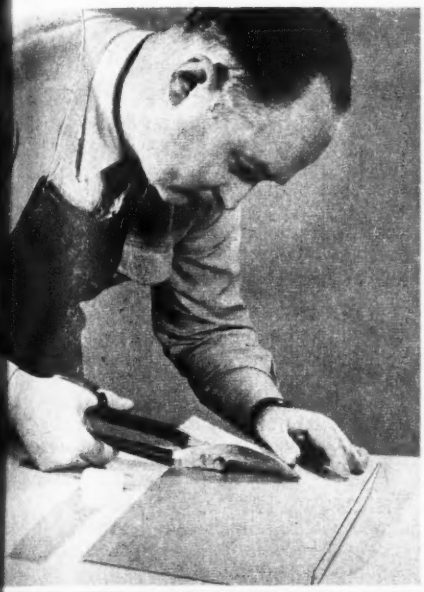
The bottom insulator measures 1¼x2 in. The terminal insulator is cut from a 2x3¼ in. piece and the ends are rounded so it will fit tightly inside the Kerr top. The [*Continued on page* 156]



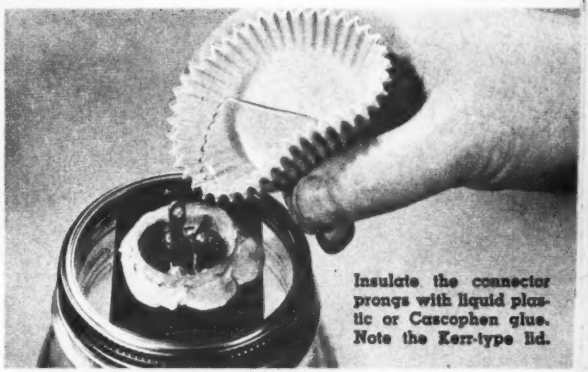
The purifying action starts immediately after the current is turned on. Note the sediment.

When all of the impurities have settled to the bottom of the jar, clear water can be drawn off.

The activator is cut out of an aluminum cookie pan. They measure 2x9 in. for a 2-qt. jar and 2x6 in. for a 1-qt. jar.



Remove two prongs from a standard plug and center them carefully on the insulator.



Insulate the connector prongs with liquid plastic or Cascophen glue. Note the Kerr-type lid.

photo drawing

Have you ever admired the pencil sketches that architects sometimes make of proposed homes and buildings? You can get a very similar effect by using the following method:

Make an enlargement on No. 2 paper and give it about three times normal exposure. When you develop the print, it will, of course, be very dark. Immerse the print in a tray containing Farmer's Reducer. Remove it when the highlights are white and you will get a "pencil drawing" effect.

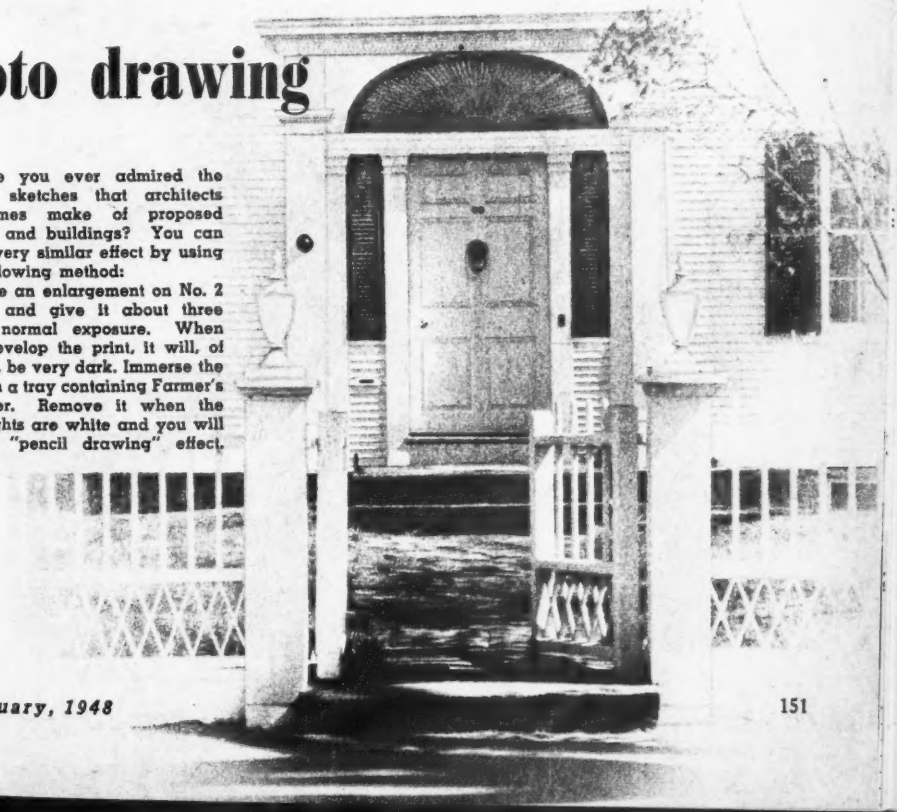
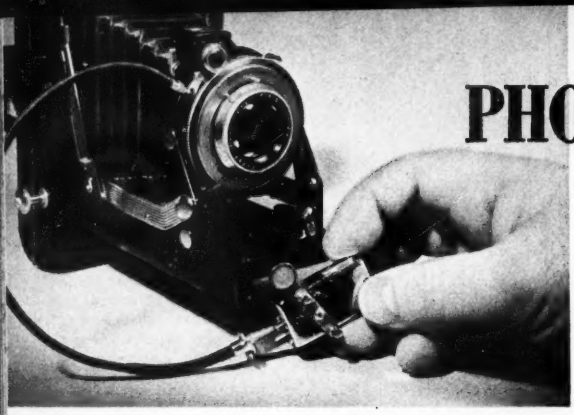
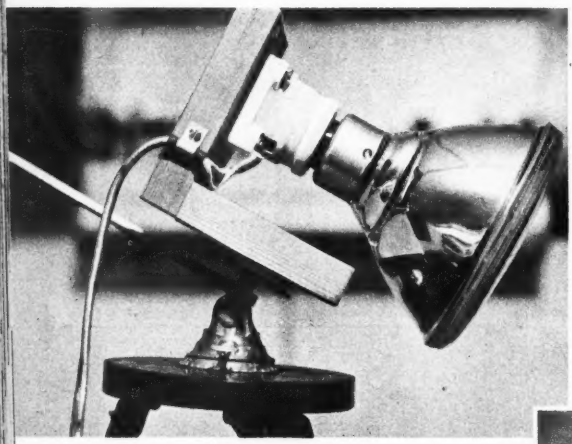


PHOTO HANDIES



IT'S A LONG TIME. You can double the delayed action of your built-in self-timer by attaching an auxiliary self-timer to the cable release. The built-in self-timer will not start to function until the second timer has run its course. This will give you at least 12 additional seconds.

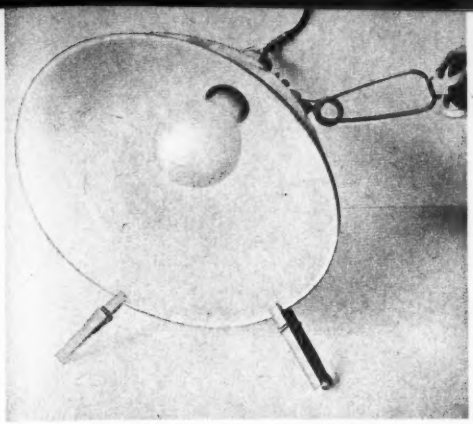


FOR LIGHTER MOMENTS. This spotlight mount is made of two pieces of 4x3½x½ in. wood butted together and secured with two screws. Mount the porcelain socket as shown and equip it with a photoflood lamp. Use the kind that has built-in reflector.

WHICH IS WHICH? You will avoid a good deal of unnecessary hunting if you mark the outside of your filter boxes with the name of the filter it contains. Use India ink. After it has dried, coat it with clear nail polish. Be sure to include filter factor.

COPY BOARD. A drawing board and a floor lamp stand are all you need to set yourself up in the business of copying. Lights should be placed at a 45° angle to the picture. It can double as a reflector too.

By using the slowest setting on your shutter and repeating it as needed, you can make accurate duplicate time exposures.



HANDY FEET. By clamping a couple of spring-type clothespins to the bottom of your photoflood reflector, you will prevent the hot surface from touching any flammable material it may be resting on. It also serves to prevent the reflector from rolling with resultant damage to the lamp or reflector.

QUESTION BOX
By Robert Brightman

Can I take infrared flash pictures with panchromatic film? Don Gould, Toledo, Ohio

Panchromatic film is relatively insensitive to the infrared and results will be rather disappointing. Infrared film should be used if you are going to use infrared-coated flash bulbs.

•

Do you have any plans for building a tripod? T. Wheeler, Waycross, Ga.

Plans for building a tripod appeared in the December 1947 issue of MI.

•

Can I use a Kodachrome Type A filter with Ansco color film, Tungsten type, to take pictures outdoors? Robert Andes, Sentinel, Okla.

Use the Ansco No. 11 conversion filter.

•

How old is my Kodak Junior Six-20? Is it worthwhile having the lens "lumenized?" J. G. Lavoie, Campbellton, N.B., Can.

You can have the lens on your camera "lumenized" but, frankly speaking, we do not advise it inasmuch as the optical system on your camera is a relatively simple one.

•

Is there a 35mm camera made that can take pictures in rapid succession without the necessity of recocking and advancing the film after each exposure? P. Van Lockhart, Akron, Ohio.

The "Robot" camera would meet your requirements. This camera takes a 1x1 in. picture but we doubt very much whether it is available at the present time.

•

What is the value of my Kodak Recomar "33"? James Littig, Masota, Minn.

Your camera when new, originally listed for $63.00.

•

Can I take pictures through a microscope? Joseph H. Caldwell, Neptune Beach, Fla.

You can take pictures through a microscope with any camera by merely removing the lens of the camera and enclosing the eyepiece of the microscope and the front of the camera with a light-tight tube. Camera and microscope, of course, would have to be held in rigid alignment. The exposure, depending upon the brightness of the specimen, is generally reckoned in minutes. In this setup, ground glass focusing is a must.

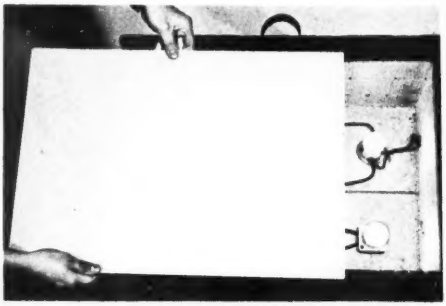
CABLE HOLDER. If your synchronizer cable has an annoying habit of draping itself in front of the camera lens, you can keep it in its place by passing it through a rubber band placed around the bracket. The elastic should not be too tight.

IT'S A SNAP. The snap binder rings from a discarded notebook can be used to advantage in the darkroom. Attach the metal strip containing the rings to the ceiling and use it to suspend films for drying. Hang a weight on bottom end of film.

SHADOWLESS BACKGROUNDS

PICTURES with shadowless backgrounds are often specified for catalog illustrations and similar commercial applications. Such pictures can be easily made by installing a number of light bulb sockets in a box as shown in the photo below.

The wattage of the bulbs used may be varied depending upon the intensity of light needed to offset the shadows cast by the regular external lighting equipment.



The light box consists of six 40-watt bulbs wired in parallel. Sheet of opal glass for even illumination is mounted 2 in. above lamps.

Built-in Bookcases

[*Continued from page* 134]

limit it to 2 in. wide. Nail the moulding to the cap piece flush against the ceiling and then drive the nail heads below the surface.

Now attach the 3½ in. wide side finish pieces which serve as door frames and then add the top and bottom finish pieces. Finally, nail the center door frame piece in place between the top and bottom finish piece. Cabinet doors are of standard size, purchased from your lumber yard much cheaper than you could possibly make them at home. The size of doors you use will decide the width of the side door frame pieces, and the space available will decide the size of the doors you use. The original project required four 1x2 ft. doors.

The doors are easily hung by using the method shown in Fig. 9. Simply lay each unit in the door frame and secure the door with strips of 1 in. wide Scotch or masking tape. Door A in Fig. 9 illustrates this method. If preferred, you can use the 4-nail method shown on door B.

Of course, it may be necessary to trim each door to fit and this should be done with a plane. After the doors are set in place, mark off the position of hinges and door knobs.

Sand the exterior surface with No. ½ sandpaper and then No. 00. Stain and varnish, or if you prefer, paint to suit. •

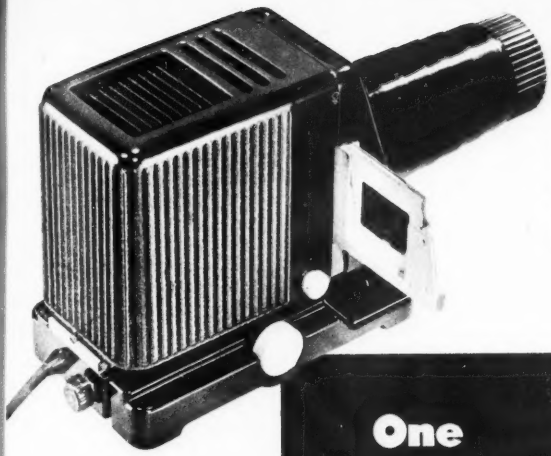
Radiator Cover

[*Continued from page* 145]

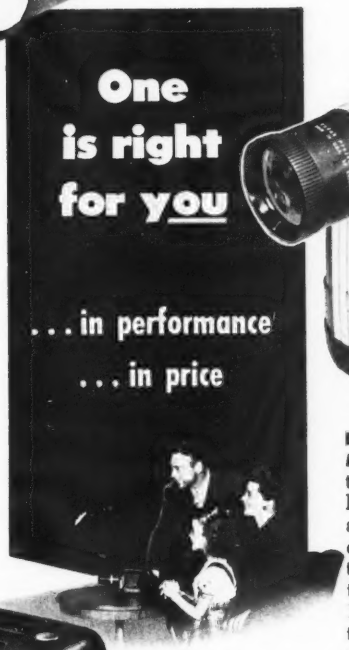
work over, bend up the four vertical panels and rivet the four vertical edges.

The wastebasket is made of six rectangular panels of sheet metal, six connecting strips of hammered sheet metal, and a hexagonal wooden bottom. Dimensions of all of these parts are shown in the sketch. When laying out the hexagon, make use of the fact that the radius of a circle subtends six equal arcs on the circumference. Set your compass at five inches, draw a circle, and then without changing the set of the compass, strike off six arcs. Connect the six points and you will have an accurate hexagon. Construction methods are similar to those used in making the radiator cover. An easy way to perform the various steps of the assembly operation is to rivet the panels in pairs, and then bend the connecting strips of hammered sheet metal over the edge of the work table. The remaining three connecting strips are then clamped one at a time between two blocks of wood, bent to the correct angle, and riveted. The wooden bottom is nailed in place.

The radiator cover creates a convenient shelf which is handy for the housewife to use as a work table when she is sewing. Moreover, as most radiators are located near windows she will be working in good light. •



KODASLIDE PROJECTOR, MODEL 2A, answers the demand for better-than-average performance at a budget price. The Kodak Ektanon Lens 5-inch *f*/3.5 is highly color-corrected . . . Lumenizing of the entire optical system increases screen brilliance 50% . . . special heat-absorbing glass protects transparencies from overheating. It all adds up to more for your money. Price $47.50.



KODASLIDE PROJECTOR, MODEL 1A *(see below)* is a star performer in any show. The whole family will get a kick out of its big, bright 40-inch-wide images . . . its sharp focusing with the Kodak Ektanon Lens 4-inch *f*/3.5 . . . its stepped-up screen sparkle through the completely Lumenized optical system. Socket in base provides handy mounting on tripod during projection. 150-watt lamp and slide carrier included. Price $27.50.

KODASLIDE PROJECTOR, MASTER MODEL *(see above)* makes your transparencies shine with a new, living realism—at home or in an auditorium. Its 1000-watt lamp delivers more light to the screen than any other 2 x 2-inch projector. Choice of 5 superb Kodak Ektar and Kodak Ektanon Lenses to meet every need . . . entire optical system Lumenized for maximum light transmission . . . efficient turbine fan cools lamp and both sides of slide. Comes with protective carrying case. Priced from $181 to $295 depending upon lens choice.

Eastman Kodak Company, Rochester 4, N.Y.

Kodak

"Kodak" is a trade mark.

MI Special Race Car

[*Continued from page* 117]

screws which hold it in place. The mount shown is for the Forster 29 but will accommodate other engines. Cast from aluminum, first carve the pattern from soft balsa and check to make certain it will fit your engine. Your local foundry will have no difficulty casting a mount but should casting facilities be unavailable, the rough mount may be procured along with the body castings previously discussed.

Mill the bottom of the mount so it will fit the lower shell and drill the three mounting holes in the body shell, using a No. 27 drill. Clamp the mount in position, spot and then drill the holes in the mount with a No. 29 drill. Tap 8-32. With the bottom of the mount absolutely flat, mark off and drill the 7/16 in. hole for the axle bushings, which are bronze of the indicated size pressed in place. The axle is a length 5/16 in. drill rod. Two bronze stops prevent the axle moving from side to side. The small stop is pinned to the axle while the larger stop is held secure with a 6-32 Allen set-screw. When screwing the stop in place, allow about 1/32 in. play.

The gears used were obtained from the Boston Gear Works, 151 Lafayette Street, New York City, New York. The axle gear is listed as No. H-2442 and requires a bushing to bring it down to the 5/16 in. axle diameter. The engine gear, No. S-2420, is attached directly to the flywheel, as shown. When bolting the engine to the mount, it may be necessary to use spacers between the lugs to obtain sufficient teeth play. The flywheel is machined from brass to the dimensions indicated and locked to the engine shaft with either a lock washer and nut or two nuts.

If you don't use an Arden Glow Plug in your engine, which will make it possible to eliminate the ignition system, making the ignition tray is next. This is cut and bent from 1/16 in. thick aluminum and set between the motor mount and the bottom body shell. The coil is suspended on a plastic arm as indicated; the battery is held in place with an aluminum band. The toggle switch is a must because it makes possible cutting your engine after you have had enough speed or noise. We definitely don't recommend running a car which cannot be stopped at will, so if you're using a Glow Plug also install the new Berkley D-3 Fuel Shut-Off Valve.

Now that the interior is complete, you can finish the outside. Rather than buff the surface, we suggest a paint job. First apply a coat of automobile primer and then spray on four or five thin layers of automobile lacquer of your favorite color. The instructions on your primer and lacquer cans will give you the exact finishing procedure. After the paint job is complete, form the two aluminum air scoops and rivet them in place. The windshield can now be added along with any other trim.

Bend a bridle from 1/16 in. steel wire and you're ready for action. If you cannot find a regular "big car" track, use your local playground, gymnasium (if the superintendent doesn't mind a little oil), parking lot or other smooth concrete or wooden area. For such sites you will need a center post to which the tether is hooked. You can easily make such a portable unit from 1 in. pipe and hold it in the center of the circle with sandbags. The top should be fitted with a ball bearing swivel (a roller skate wheel will do the trick) and the distance from the floor to the swivel should be about 12 inches. Your running circle radius can vary anywhere from 12 feet up. Airplane cable having a diameter of 1/32 in. will make a safe line as will .049 steel piano wire.

The MI Special represents the first major attempt to promote the smaller race cars and naturally many "bugs" will develop as new engines, different gear ratios and power plant installations are tried. Many problems will be encountered and solved during this pioneer work. Won't you keep us posted? •

Electronic Water Softener

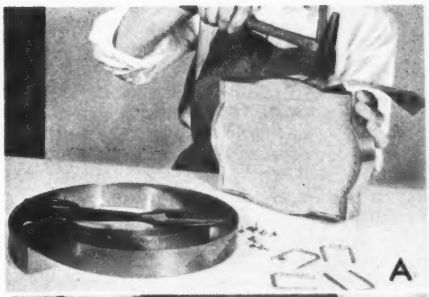
[*Continued from page* 150]

ends should also be rabbeted so that the top may be screwed down far enough to secure the insulator tightly. Remove two prongs from a plug and bolt them on the terminal insulator. Make sure they line up with the female half of the plug. To assure that fingertips cannot come in contact with the prongs when the current is on, surround them with liquid plastic. Make a wall out of plastic weatherstripping, or putty, around the prongs as a form in which to pour the liquid plastic. After the plastic has hardened, remove the form.

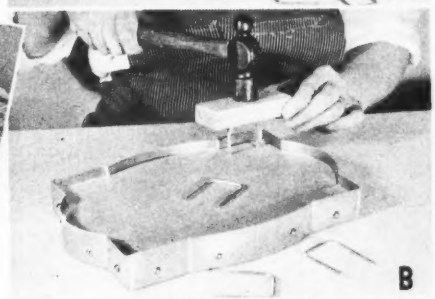
To use your purifier, fill the jar to 1 in. or more below the top with tap water; insert the activator and screw down the Kerr lid; *then* attach the electric extension plug and turn on the current. Leave it on until the water is quite hot to the touch of the hands on the *outside* of the jar. Then remove the plug, remove the cap and remove the activator, in that order. You will notice that as soon as you turn the current on, air bells will cling in profusion to both legs of the activator. After a few minutes, the impurities rapidly settle to the bottom. *Never connect the electric extension to the activator unless it is inside the glass jar, where your fingers cannot get at it.* •

Snack Set

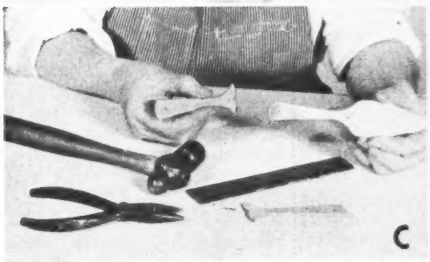
Cheese and crackers, the epicure's delight, tastefully served on a tray.



A



B

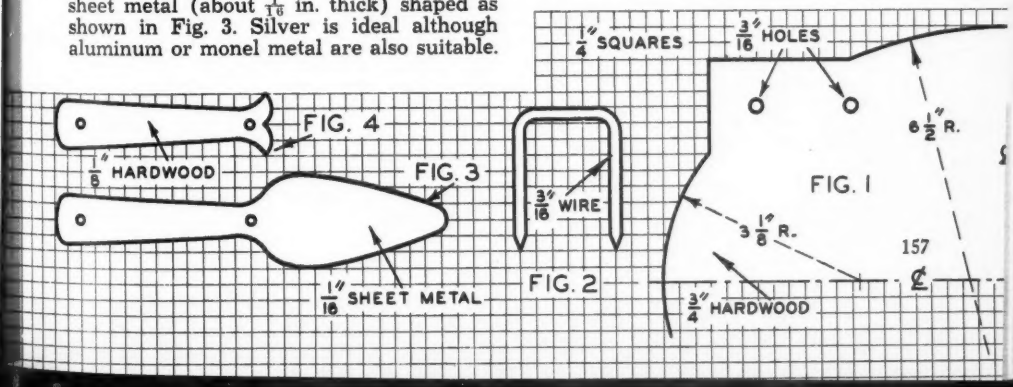


C

CRACKERS and cheese after dinner will be doubly welcome when served on this clever little cheese board.

Cut a ¾-in. thick piece of hardwood to the shape shown in Fig. 1 and nail a 1¼-in. strip of polished brass around it as is being done in Photo A. A strip about 36 in. long will allow for a little overlap and a few inches to spare. Cut four 6-in. pieces of $\frac{3}{16}$ in. copper or brass wire, file points at both ends of each piece and bend them to the shape shown in Fig. 2. Then drive the wire into the board, locating the holes as indicated in Fig. 1. Use a block of wood to avoid deforming the wire, see Photo B.

The cheese knife is made of a piece of sheet metal (about $\frac{1}{16}$ in. thick) shaped as shown in Fig. 3. Silver is ideal although aluminum or monel metal are also suitable. The handle is made of two pieces of ⅛ in. thick hardwood, shaped as shown in Fig. 4. Paint the wood black and rivet the three members together, Photo C. The tray should be finished with shellac. •



How to Refinish Furniture

[*Continued from page* 143]

stain; they will level off as sanding continues, and you can go heavier on darker spots and lighter on pale spots to get uniform tone.

Dust the work well, wipe again with benzine and you are ready to begin the refinishing process. Assuming that the original color is to be reapplied, a stain over the old stain will be necessary. Oil stains come in standard types for oak, maple, mahogany, walnut, etc. Select the closest to the old stain. The cellaret was given a light mahogany stain to retain the brilliance of the wood grain but still not be quite as dark as the original. Brush on the stain, allow to set about fifteen minutes and wipe off with a clean rag, first against then with the grain. Since the stain is an oil pigment it must dry for twenty-four hours, after which the final finishing coats may be applied.

A wash coat of shellac is the first thing, regardless of whether varnish or lacquer is going on over it. Here we deal only with varnish, which may be brushed on, while lacquer must be sprayed, an operation that requires fairly expensive equipment. "Wash coat" simply means white shellac diluted by about 50 to 100 per cent with denatured alcohol. Its purpose is to seal the wood for the final coats. Three or four hours after brushing on the shellac coat you can rub it down with steel wool. Rub to a fine dull surface, first in circles, then up and down with the grain.

You are now ready to varnish. Before attempting this, bear two things in mind. Varnishing must not be done on a humid day, and both air and work must be as dust-free as possible. The former qualification can be determined by a weather report; the latter by closing windows and wiping the work with a rag soaked in turpentine. Varnish is flowed on with light, one-way motions of the brush, not plastered back and forth as in painting. Allow the first coat to dry 48 hours, then sand lightly with 5-0 or finer paper. The second coat goes on in the same manner, but is rubbed after the drying period with No. ½ or FF powdered pumice mixed with water. Use a soft pad of cotton or felt for the rubbing. The third and final coat is rubbed in the same manner, but longer, first with the cloth pad then with the bare palm until a satin polish, smooth as glass, is obtained. Flush the surface with water to remove all pumice remnants, then wipe with benzine. Final step is a coat or two of hard wax, vigorously rubbed.

To obtain a very light or blond finish the same general steps are followed, but you must cut deeper through the original stain by sanding until the wood is quite light. A bleaching solution is then applied, followed by further sanding and natural commercial filler if the grain is open. A saturate solution of oxalic acid makes a good bleaching agent. •

Toy Ferris Wheel

[*Continued from page* 141]

about 2 in. long to it. Using the hole in the collar as a guide, drill through the brass piece. Line up the hole in the collar with the hole in the wheel and fasten the end of the brass piece to the wheel with a screw. Place a flat washer and a collar on one end of the main shaft. Place the wheel between the uprights and slip the main shaft through, using about six spacing washers between the wheel and the uprights. Now place a flat washer and the large driving sprocket on the other end of shaft. This sprocket is Boston Gear, CBA 32. Tighten setscrews in all collars and the sprocket. As this sprocket has ¼-in. hole, it is necessary to use a bushing. Turn the wheel and see that the cars pivot freely.

The worm shaft is now made. It is 3¼ in. long and is mounted on brass angles. The shaft holes are ¼ in. from the long end, and the short ends are screwed to the base in the correct position, using two screws on each so they won't shift and bind the shaft. The lower sprocket is mounted on one end of the worm shaft. Next to this, on the other side of the angle support, mount a sprocket to drive the music box. Next item on the shaft is a worm gear and last a collar on the outside of the angle support. See that the shaft turns freely. Connect the sprocket on the wheel with the one on the worm shaft with a brass ladder chain. Gear your motor so that the Ferris wheel makes about 15 rpm.

The music box used was originally a hand-cranked model. Remove the crank and replace with a sprocket. Connect this sprocket with the one on the worm shaft with brass ladder chain.

A box to cover all the works is made from plywood. Do not turn the wheel by hand as the worm gears may be damaged.

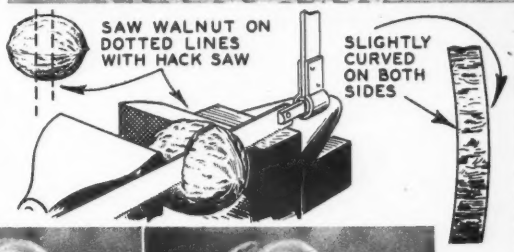
The circular current collectors for the lights are cut from thin brass. Leave small ears for attaching to the side of the wheel opposite the driving side. Tubular carbon brushes are placed in pieces of brass tubing about 1½ in. long. Collars to fit the outside of this tubing are then soldered to pieces of flat brass about 2 in. long. These are then screwed to the upright supports of the wheel, spacing the collars ¾ in. apart. The brass tubes were put through the collars and the setscrews locked. Holes, drilled near the end of the tubes, allowed the wire from the power supply to go through, thus holding the brush springs under tension as well as making contact. Twelve sockets are mounted on the outside of the wheels between the cars and eight sockets near the center hub. Sockets are wired in parallel. After everything is in good working order, disassemble the entire wheel, sand all wood parts and paint bright red with yellow trim. •

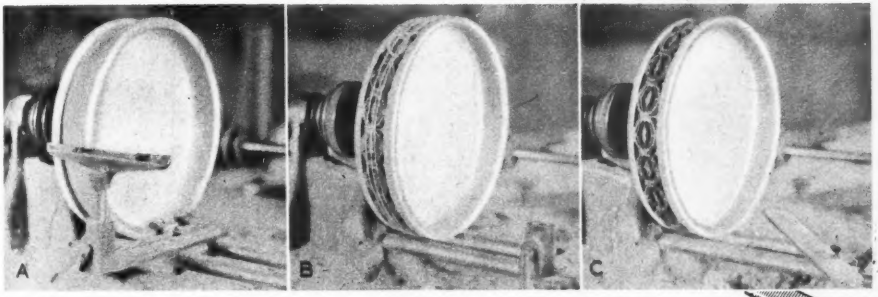
NUT BOWL

HERE is a way for the craftsman to make decorative use of the natural elaborate design found in the cross section of walnut shells. Sections, cut from the center of as many shells as are needed, are used as a filigree for the center of this unusual nut bowl. These sections are slightly curved on an emery wheel to make them fit the curved surface of the bowl.

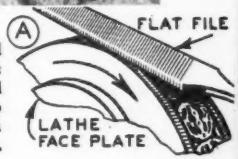
The bowl and base are simple lathe jobs turned on a face plate. The bowl is 9 in. in diameter and 1¾ in. thick. A channel is turned in the rim of the bowl for the shell sections. This channel is governed by the size of the nuts used. The inside of the bowl is hollowed out as shown in the sketch and the entire surface is well sanded.

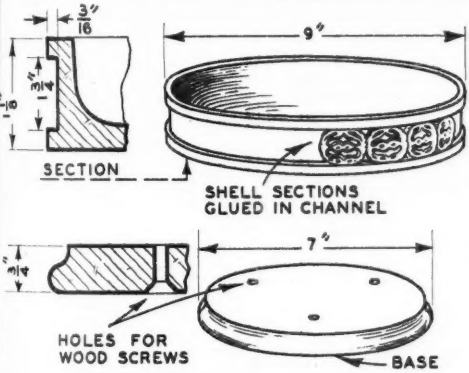
The photographs show the three stages of the inlay work. The base is turned out of ¾-in. material and is 7 in. in diameter. It has an offset edge and is attached to the bottom of the bowl with small wood screws. The entire bowl is given two coats of clear varnish. A bit of color can be added by painting the bottom of the channel before the shell sections are glued in place. •

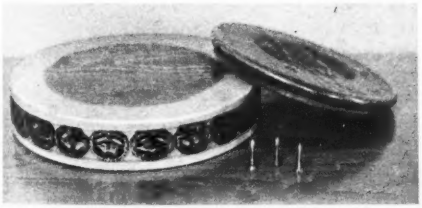




A: Bowl in lathe with channel turned for shell sections. B: Shells glued in place and bound with cord for drying. C: Sharp file is used to turn shells down even with the face of channel.







Left: The base is turned from ¾-in. stock and is then attached to bowl with three flathead wood screws. Right: The bowl with the base attached. It should be finished with a coat of varnish.

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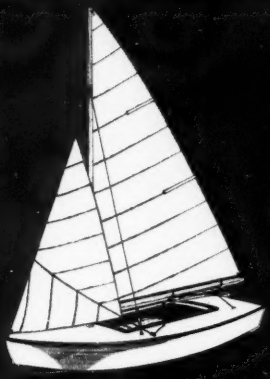

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Tie Your Own Flies

[*Continued from page* 101]

direction. The tip end of the hackle is secure to the shank by two or three wrappings. Th other pair of hackle pliers is now clamped the butt end of the hackle and this is turne round the shank enough times to produce th amount of leg material desired. The butt en is then secured with two or three turns of th winding thread. Surplus is clipped off close the shank. Here is where a "dubbing needle is sometimes used to free any of the hack fibers that have been doubled in. They shoul stand out straight from the shank.

The wings come next, and the beginne should understand that in order to have mate he should make one wing from the left an one from the right feather of whatever bir is supplying the material. A piece is clippe out of each feather right at the quill. The oute edges of the natural feathers become the end of the fly's wings and these should not b clipped.

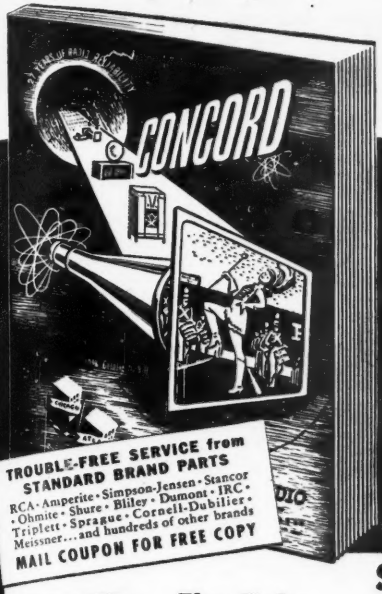
Placing the wings right is one of the mos difficult feats for the beginner. One should b on each side of the hook, with butt ends forward. When they have been wrapped, the but ends are clipped off. A few more turns of th thread now form the head. Two or three hal hitches or a whip knot may be used to secur the thread end, and a drop of cement over thi finishes the fly.

The fly we have been describing will be a wet fly, which is the simplest to make. Dry flies have become about as popular as th older type in recent years. They require a somewhat different technique in wrapping so as to make the feathers and hairs stand ou at right angles from the hook.

Anyone can tie a fly if he has the patience. It may take an hour at the beginning to turn out one specimen good enough to fool a fish. It's far easier to select one's flies in a tackle store, of course, but tying one's own flies gives a great deal of satisfaction. And it gives the ardent fly fisher something to do in the off seasons. While laboriously fashioning his bits of colorful feathers and hairs he can dream of lake and stream and the happy days to be.

The paiche, or pirarucu, an upper Amazon fresh water food fish, sometimes found 15 feet in length and 400 pounds in weight, is now being commercially raised on a fish farm in eastern Peru.

The male halibut rarely grows to a weight of more than 40 pounds, but females have been found weighing ten times as much.



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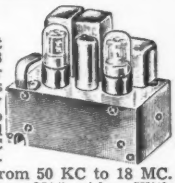

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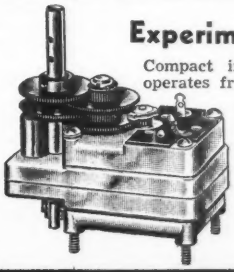
Experimenters Motor



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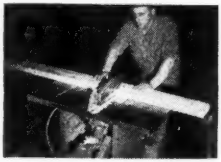
New 10 INCH TILT/ARBOR FLOOR SAW

NEW — from its large, precision-ground table to its extra-heavy base . . . built to exacting industrial standards for commercial or home shop use . . . designed for easier, more accurate sawing . . . that's this new Atlas 10" Tilt/Arbor floor saw!

You really have to see it to appreciate its advanced engineering and precision construction. The large 27½" x 27½" table gives you 13¼" working surface ahead of the blade. New engineering design gives you maximum blade rigidity in any position with easy-working height and angle controls. Saw arbor turns on precision ball bearings.

An outstanding feature is the rip fence — *self-squaring*, locks at *both* ends, *releases instantly* for positioning or removal — with *two ball bearings on rear rail* for easy sliding.

This new Atlas saw is really *built*— to give you years of dependable service. Ask your Atlas distributor, or send the coupon for free illustrated bulletin.



• 27½" x 27½" table — with 13¼" working surface ahead of blade; 19½" to right, 8" to left • Cutting depth: 3¼" • Blade tilts to 45° — locks rigidly at any height or angle • Sealed, precision ball bearings for permanent smooth operation • Dual V-belt drive — uses standard 3450 RPM motor • Massive construction

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Arid Palestine

[*Continued from page* 63]

the lake formed by damming the Jordan, would increase the rainfall in the arid valley region and thus supplement irrigation in the task of transforming arid Palestine into fertile farmland.

About thirty years ago, Pierre Gandrillon, a French engineer, had a somewhat similar plan for canaling water from the Mediterranean across the mountains to the Dead Sea. His object, however, was to create electric energy. Since at that time there was no pressing need for electric power in this barren countryside, no action was taken on the Gandrillon plan.

Dr. Lowdermilk's proposal, however, is aimed at reclaiming and conserving the land, with production of electric energy as a by-product that could aid new enterprises in the reclaimed region and thus add to the general prosperity of those settling the revitalized area.

The American scientist's plan for remaking Palestine is entirely feasible. With financial backing, engineers would have little trouble in performing their hydro-magic and creating again a land "flowing with milk and honey."

Working without pressure, the project could be easily finished within ten years. If treated as the emergency matter it actually is, the plan might be rushed to completion in a few years.

The $250,000,000 estimated cost? That used to be a lot of money. These days, however, that's no more than the price of temporary aid to Greece. Divide that sum among the two million people who would benefit by the plan, and the breakdown for each person would be less than the current price of an electric washing machine or a small refrigerator.

That's little enough to pay for not only reclaiming the land but also reclaiming the broken lives of 2,000,000 of Europe's displaced persons and solving one of the world's most tragic problems. Fortunately, work is already under way to raise the money to make water-poor Palestine truly the "Promised Land" for these despairing people. •

One American turkey farm has modernized its killing process by using electricity; birds are electrocuted with 450 volts in from five to 15 seconds.

Snowflakes break into tiny particles as they strike an airplane in flight; on breaking up they may create sufficient static electricity to blackout radio voice communications between plane and ground.

A key tool to increase your shop's "capacity" is the new Power King band saw. Gives you new speed and accuracy in every band saw operation in wood, plastics, and light metals.

You can be sure of smooth, accurate sawing with the Power King — it's a *solid* 135 pounds of properly engineered weight. Big (14" x 14") *precision-ground* table has 12" capacity from blade to frame 6½" from table to guide — tilts 45° to right. Saw cuts to center of 24" circle. Saw wheels turn on 4 *precision* ball bearings. Blade is guided by 4 oilite bronze bearings — supported in back by 2 *ball* bearings.

Here's a quality tool you'll be proud to have in your shop — built for years of service. Send coupon for complete details and name of nearest dealer.

OTHER TYPES OF POWER KING SAWS

POWER KING 7"-8" TILT/ARBOR TABLE SAWS

POWER KING 15" JIG SAW

POWER KING TOOL CORP.
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Please send new Power King catalog sheets to.

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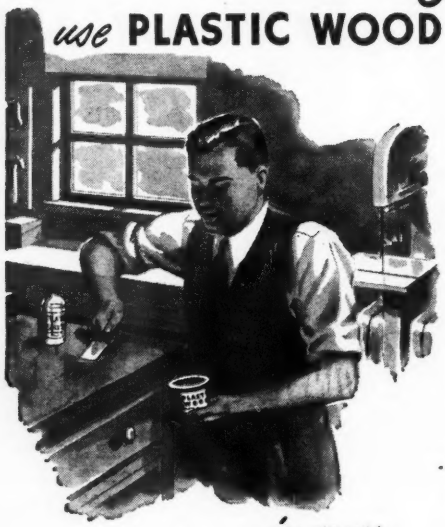
For Cabinet Finishing *use* PLASTIC WOOD



in your HOME WORKSHOP!

If you'd like a satiny smooth, professional finish on your next cabinet job—use Plastic Wood! It's an ideal filler for cracks or rough grains, dries tight and hard, sands to a swell finish and takes paint, lacquer or varnish perfectly. Here's an extra hint—knot holes or gouges just disappear when this handiest filler is used! *Handles like putty—hardens into wood!*

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FOR FILLING . . .
- Countersunk screws
- Chipped furniture
- Nail and screw holes

FOR REPAIRING . . .
- Loose casters
- Broken balusters
- Broken furniture

● *You'll want* Plastic Wood SOLVENT, *too.* Get both at one time. It is made especially to control the consistency of Plastic Wood . . . useful also in removing dried Plastic Wood from tools and fingers.

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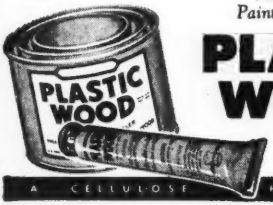
At all Hardware, Paint and 10c Stores



PLASTIC WOOD

Tube or Can

A CELLULOSE FIBRE FILLER

How to Survive a Crash

[*Continued from page* 80]

plane, the Viking, built by Vickers-Armstrong.

Results of the crash researches have been flowing to light-plane makers, along with suggestions for redesigning the cabins, and the makers are acting on these suggestions.

Seven significant changes in design reported for planes now building are:

1. Occupants are seated farther aft in six new models.
2. Instrument panels are moved farther forward in four planes.
3. Four models will have no bracing tubes near the pilot.
4. Solid transverse structures within range of the head have been eliminated or moderated in ten new planes.
5. Hinged backrests on forward seats are being built in six models.
6. Five instrument panels have been redesigned to lessen the danger of head injury.
7. The strength of practically all safety-belt installations is being increased, since it has been found that too often the present 2,000-pound belt breaks.

Thanks to Hugh De Haven and his assistants, and the cooperation of leading aeronautical engineers who are heeding their gospel, aviation death lists will be smaller. We'll crack 'em up but we'll walk away! •

Unusual Gadgets

[*Continued from page* 95]

cockroaches the size of a man's thumb will be given carte blanche on any product that is supposed to be roach-proof. The most severe test a garment can be given is to turn a few pet carpet beetles loose on it. These gluttonous worms will eat anything, and once proved it by gobbling up a mess of steel wool and thriving on it.

Most people go to great lengths and expense to rid themselves of household pests, but not UST, who pays as much as 50 cents apiece for fat, juicy cockroaches, and a dollar apiece for robust bedbugs. Flies, they get for a song—10 cents apiece.

However, if you want the efficiency of a new insecticide tested, it can cost you as much as $25 for each bug knocked off. To get a garment scientifically moth-eaten will cost you $10 per first sample. $30 will get your shoe worn through, providing it's a man's shoe. Women's and children's shoes come cheaper—$20.

So far, no dealer in chinaware has asked UST to test his china by turning a bull loose in his shop, but if one does, UST engineers won't even lift an eyebrow. •

AMAZING NEW SAFE MAGNETIC JIG SAW

Ready for Profit or Pleasure!

NUMBER 2,000

SYNCRO

For Hobbyists Craftsmen, Light Production

ONLY **$17.50**

Shpg. Wt., 18 Lbs. Slightly higher in foreign countries

GREATEST CLEARANCE, LARGEST TABLE TOP OF ANY MAGNETIC SAW MADE!

Get SYNCRO . . . the remarkable, safe, patented magnetic jig saw . . . ready for immediate shipment! Use for fun or money-making! SYNCRO needs no belt, no gears, no oiling. No motor to buy. Just plug in any 50 or 60 cycle (A.C. only) 110-120 volt wall outlet—in kitchen, attic, basement—set on kitchen table, floor, anywhere—and saw! The high-speed, short Magnetic Safety Stroke Action, and freedom from belts, makes SYNCRO so *safe* small boys and girls may use it. Cuts intricate designs on ⅝" soft wood ½" medium hard plywood and thinner hardwoods plastics, thin metal. Leaves no ragged undersides on plywood, cardboard. Cuts to center of 27" circle! Get, enjoy this safe, educational, practical quality tool for making models, displays, puzzles, inlays, silhouettes, toys, what nots, etc. Limited supply—so hurry!

Complete with Cord. 3 Blades

WHY SYNCRO IS SAFEST!

SYNCRO has NO continuous cutting blade nor "Long stroke" blade to *pull* fingers into teeth—instead there are 14,400 strokes per minute—7,200 short cutting strokes plus 7,200 upward NON-CUTTING REPELLING strokes! (Fig. 1) SYNCRO will not even CUT wood unless piece is pushed FIRMLY DOWNWARD AGAINST blade and FIRMLY FORWARD—both actions at SAME time! SYNCRO blade teeth cut ONLY on DOWN stroke. (Fig. 2) Teeth raise, repel, push away any object on UP stroke. (Fig. 3) When blade moves UP it KICKS finger away free! On down stroke, blade does not move *far enough* to accidentally cut finger unless finger is *intentionally, deliberately* fed into blade like wood is fed in Figure 1. No wonder SYNCRO is the world's SAFEST saw . . . a feature old and young users acclaim!

"FAMILY SAW"

"The SYNCRO POWER SAW ordered from you in 1940 is still sawing merrily away. My son (then 8) has used it in the attic, kitchen, his room, and basement shop. I use it too. We never worry about accidents due to its MAGNETIC SAFETY STROKE feature. It's truly a family saw."—Mr. B. H. Smith, Rexburg, Idaho.

ORDER NOW ON 10 DAY TRIAL!

Order with *complete confidence* on *this* liberal Trial Offer: When you get your SYNCRO, plug it in and saw, as per directions. Then, if it does not saw *cleaner, better* than any other jig saw you ever used, and with more safety . . . if it does not satisfy YOU . . . return it undamaged, postpaid and post-marked within 10 days of its delivery date . . . and we will refund the saw price promptly without question!

SEE YOUR DEALER FIRST!

15 OUTSTANDING SYNCRO FEATURES:

(1) World's safest saw. (2) Portable. (3) No rotating motor needed as self-contained magnetic power unit transmits A. C. magnetic impulses to armature (diaphragm—power transferred to blade. (4) No rotating parts to wear out. (5) 14,400 magnetic strokes per minute. (6) Never needs oiling. (7) Large 10"x10" table top. (8) Cross section engraved lines on top. (9) Big 13½" throat clearance. (10) Finest steel blades. (11) Rubber feet. (12) 5' cable, plug. (13) Varying voltage adjustment nut. (14) Lifetime durability. (15) Quality materials, workmanship, performance . . . guaranteed by the famous "SYNCRO" trademark name.

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EXPORT ADDRESS: 120 Wall St., N.Y.C.
WORLD'S LARGEST MAKERS OF ELECTRIC JIG SAWS

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Gentlemen: Here's my order for one SYNCRO MAGNETIC JIG SAW, Model No. 2000, shpg. wt. packed, 18 lbs. $17.50 FOB Factory. Please send it complete with electric cable and plug, 3 blades, on your 10 Days' Money Back Trial Offer. I enclose $17.50 as payment. Please ship saw:

☐ Express charges collect or ☐ Parcel Post charges collect
☐ Express, for which I enclose an extra $_____
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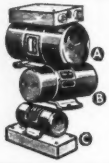
☐ I enclose no money—send FREE SYNCRO CIRCULAR

BRAND NEW ARMY AIR FORCE
ASTROGRAPHS With Case

New B29 navigation instrument which can easily be used to make a good contact printer, strip map holder, etc. The plywood case 14½"x11"x10" high is perfect as a tool kit, camera, projector case or for building a portable phonograph, picnic kit, make up case, etc., has leather handle reinforced covers, 8 covered compartments in bottom. Cost Gov't $125.00. Add postage for 20 lbs.

Only **$3.95**



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Dynamotor A—Input 12 volts, output 1000 volts at 350 MA. Shipping weight, 72 lbs..... **$7.95**

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One of the army's finest built by Kellogg. Ideal for public address, transmitters, etc. Add postage for 5 lbs..... **$2.95**

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Power supply kit to convert motor to 110 V.A.C. Add postage for 6 lbs. **$2.49**

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Used by army in noisy applications. In aircraft, tanks, etc. Many interesting home uses. Add postage for 1 lb..... **$1.00**

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$1.00 BC746 Tuning Unit contains two crystals, receiving coil and condenser and transmitter tank coil, fine for radio builders. Add postage for 1 lb.

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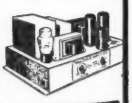

Complete kit to build excellent 25 watt amplifier, ideal for P.A. system, phonograph amplifier, etc. Push pull circuit using best parts. Supplied with 4 tubes, punched chassis, blueprints and instructions. Add postage for 25 lbs..... **$14.95**

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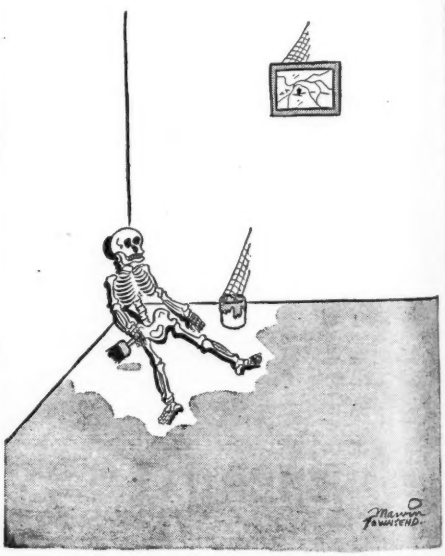
Steel wire is used in this experimental tire developed by United States Rubber Company for use on heavy trucks. Strength of the steel makes tire more resistant to blowouts, while use of fewer plies results in a cooler running carcass. Tire in photo has been cut away to show top ply of wire cord. Holding a spool of the wire is Arthur E. Benson, of U. S. Rubber's tire development department.

The new truck tire, pronounced a success after thorough highway tests on the heaviest trucks, is a far cry from the old fabric tire.



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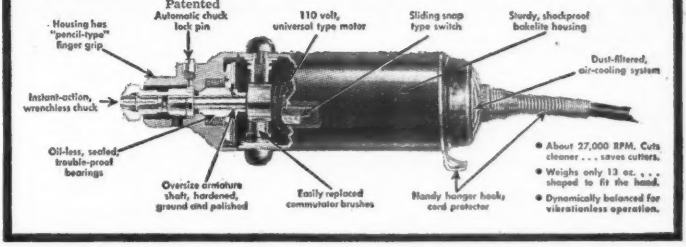
14 REASONS WHY MOTO-TOOL'S A BETTER BUY



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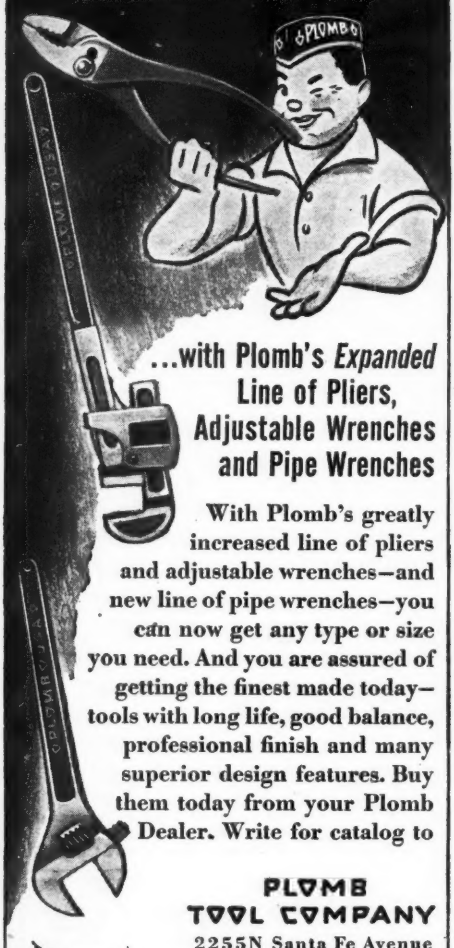

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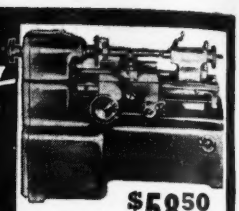

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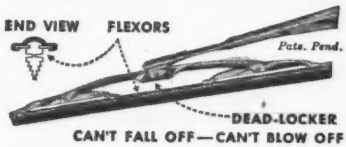

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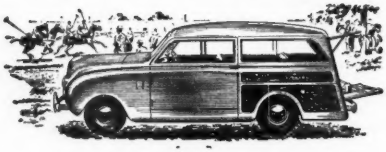

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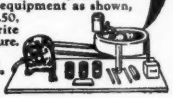

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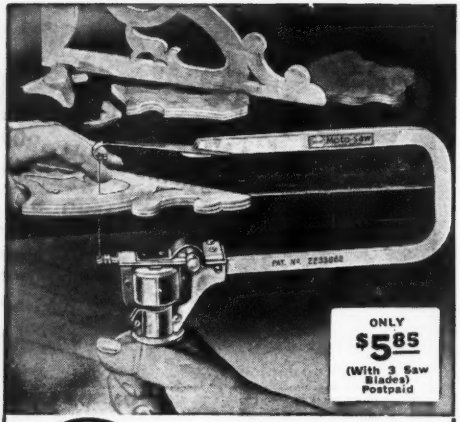

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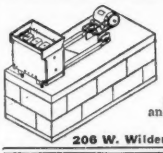

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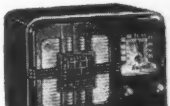

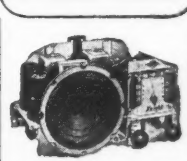

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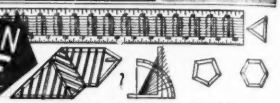

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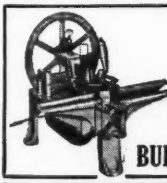

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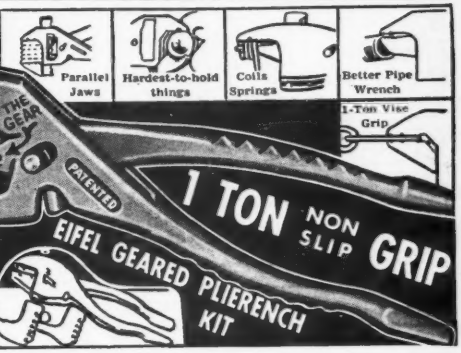

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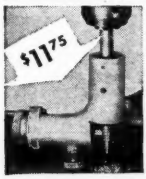

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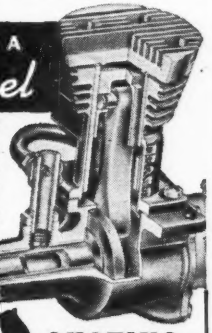

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MAKE EXTRA Money handling magazine orders in your community! Build your own business. Helps furnished. Big demand. Wholesale catalog sent Free! Write today. McGregor Magazine Agency, Dept. 11, Mount Morris, Ill.

CALL ON friends with greeting card assortments, birthday, get-well, others. Floral stationery. Gift wrappings. Big profits. Experience unnecessary. Samples on approval. Wallace Brown, 225 Fifth Ave., Dept. B-4, New York 10.

LOOK HERE! Wanted—Men to start in business on our capital. Sell some 200 farm-home Products. Thousands our Dealers now make quick sales, big profits. For particulars write Rawleigh's, Dept. B-192-MOM, Freeport, Ill.

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AGENTS WANTED for our coin operated amusement machines in every town and community. Sell to clubs and homes; or start a route. Webb Distributing Co., Dept. M-12, 6 S. Kedzie Ave., Chicago 12, Ill.

WOULD YOU pay 3%—first $350 made? Color-illustrated book "505 Odd Successful Enterprises" free! Proven! Work at home, office. Expect something odd! Pacific, Oceanside, Calif.

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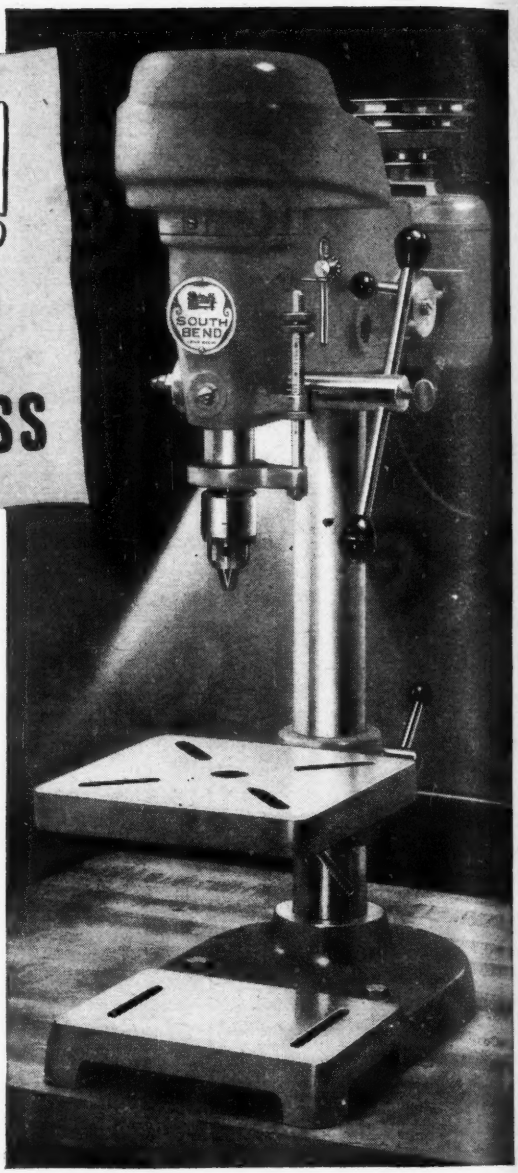

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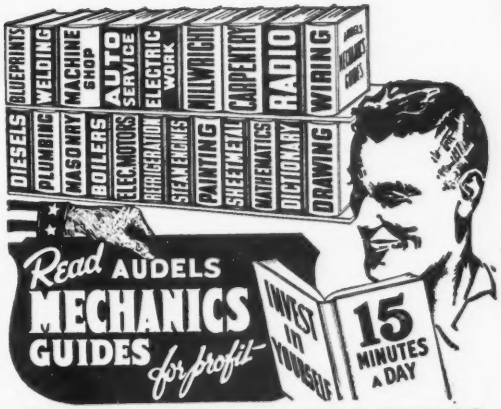

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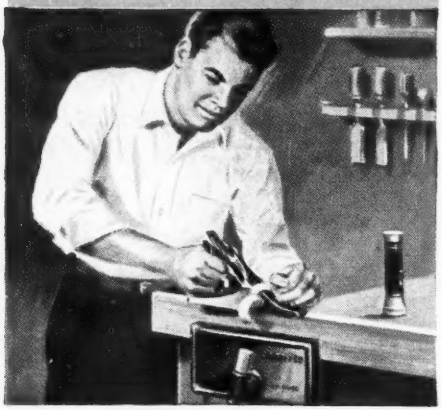

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